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CONTENTS.

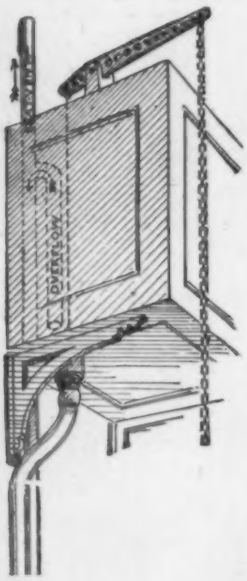
Editorial Summary.
Annual Convention of the American Institute of Architects.
Bearing Power of Soils.
With the British Association at Bath.
German National Industrial Exhibition in Munich.
Excavations at Cyprus.
Gambetta Monument.
Communications.
Notes and Clippings.
Trade Surveys.

ILLUSTRATIONS.

Sever Hall, Cambridge, Mass.
(Gelatine Print issued only with Imperial Edition.)
The Rejected Design for the Congressional Library, Washington, D. C.
House at Minneapolis, Minn.

THE

SANITAS WATER CLOSET



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CONTENTS

SUMMARY —
The Twenty-second Annual Convention of the A. I. A. — A Gold Trust. — Sewage Disposal at Berlin. — Successful Irrigation. — Mistakes in Architecture. — The Expansion of Ice. — The Manchester Ship Canal. 201
THE TWENTY-SECOND ANNUAL CONVENTION OF THE AMERICAN INSTITUTE OF ARCHITECTS. 203
ILLUSTRATIONS: —
Sever Hall, Cambridge, Mass. — The Rejected Design for the Congressional Library, Washington, D. C. — House of A. J. Kennedy, Esq., Minneapolis, Minn. 206
BEARING POWER OF SOILS. 206
WITH THE BRITISH ASSOCIATION AT BATH. 208
THE GERMAN NATIONAL INDUSTRIAL EXHIBITION IN MUNICH. . . 209
EXCAVATIONS AT CYPRUS. 209
THE GAMBETTA MONUMENT, PARIS. 211
COMMUNICATIONS: —
The Present Practice of Slow-burning Construction. — Eyebrow Dormers. 211
NOTES AND CLIPPINGS. 212
TRADE SURVEYS. 212

THE Twenty-second Annual Convention of the American Institute of Architects, which was held in Buffalo on the seventeenth of October, although well attended, seems to have been rather barren of results. About fifty members were present, representing all parts of the country. The principal business was the consideration of the reports of committees appointed by the last Convention, on the consolidation of the professional societies; on uniform building contracts, on forms for Chapter reports; on the provision of a permanent home for the Institute, and on the indemnification of Mr. Bloor. Of these reports, that on the consolidation of societies was decidedly the most important, and a long discussion took place upon it, which seemed to show that nearly everybody wished for such a consolidation, but that no one knew just how to bring it about. One gentleman thought the union very desirable, but believed that the members of one society ought to join the other as individuals, not as a body, to which another replied that if the requirements for admission to both societies were the same, there was no very obvious reason why the two bodies should not unite directly, without a previous dissolution of either, which would be unpleasant, and rather mortifying, to the members of the one dissolved. The result of the debate was that a resolution was unanimously adopted, "amid applause," to the effect that a union of the societies was desirable, and another year allotted to the task of trying to bring it about. Whether the next year will be more fertile of results than the past one remains to be seen.

A NEW scheme is on foot, suggested by the operations of the syndicate which now monopolizes copper production, having in view a combination of all the gold mines in the world for the purpose of advancing the price of the precious metal. At least, that is the ostensible purpose, but the prospectus of the company which is to be formed to carry out the project, as we find it in the Chronique Financière of *Le Génie Civil*, reads to us a good deal as if the profits of the promoters would be derived from the pockets of the stockholders, rather than the more refractory quartz rock. The fact is that very few gold mines are profitable in any case. It is said, we do not know how truly, that the richest gold mine ever discovered, the Ophir, on the Comstock lode, which is now exhausted, never paid its stockholders in dividends enough to make good what they had invested in it; and there are hundreds of mines which produce a certain amount of gold, at a loss to their owners. A syndicate which would succeed in advancing materially the cost of the metal must control these unprofitable mines, to cut off competition from them, and gold is much too widely scattered a substance to be easily monopolized. In Philadelphia the very mud of the streets contain it, and it is estimated that any industrious real estate owner in that city can wash out about a dollar's worth of gold a day, at present prices, from the clay on which the town is built; while an Artesian well driven in Boston disclosed the fact that this city, also, rests on a stratum of auriferous quartz of considerable richness. If any combination should double the value of gold in a few days, as the Société des Métaux did that of copper, we might expect to see every Philadelphian, to whom an income of two dollars a day was an object worth striving for, digging up his garden to wash out the precious particles; and thousands of scanty auriferous deposits, in all parts of the world, would be worked until competition had brought the price back to its normal level.

IN anticipation of the proposed utilization of a large part of the sewage of Paris, by irrigation on the fields of Achères, a Commission, appointed by the French Senate, recently visited the irrigation fields at Berlin. These are now in working order, and furnish the most extensive example of sewage purification by irrigation in the world. Berlin now contains more than thirteen hundred thousand inhabitants, having trebled in population during the last twenty years. In the outlying districts the cesspool is still used, but the whole of the closely-built portion of the city, containing eleven hundred and fifty thousand inhabitants, is thoroughly sewered, and all waste-matters from this part of the population are carried by water to the pumping stations from which they are distributed on the irrigation fields. The method of distribution is very simple. According to the account in *Le Génie Civil*, each of the twelve sections into which the drainage system is divided is furnished with a huge cylindrical reservoir, into which the crude sewage is pumped. Here it is allowed to settle slightly, and is strained by gratings, passing thence to a well, about ten feet in diameter, from which the comparatively clear liquid is pumped directly into the irrigation pipes. These consist of cast-iron mains, with branches of earthenware, most of which are mere open channels. In order to prevent breaking the pipes by the pressure in case they should become clogged, stand-pipes, open at the top, are attached at intervals. The height of these pipes determines the maximum pressure which can exist in the mains connecting with them, as any greater pressure will be relieved by overflowing. As the street wash is brought in the same sewers as the house drainage, the quantity of liquid to be disposed of is very large, and the ground, which rests on an impervious stratum three or four feet below, is unfavorable to filtration. In the first experiments, one acre of irrigation fields was allotted to four hundred inhabitants, but it was soon evident that this was not enough, the land becoming soaked and muddy, and the effluent being imperfectly purified. More land was bought, and an acre set apart for each three hundred inhabitants, but this was not sufficient, and the irrigated fields now comprise about eight thousand acres, while six thousand more remain to be taken into service as the population of the city increases.

THE liquid is applied to the ground by means of the open channels, which are barred by wooden gates, to change the flow as required. The separate patches formed by the conduits are laid out with ridge and furrow, and all sorts of vegetables are successfully grown, together with flowers, principally roses and violets. Of course, the neighboring city furnishes a market for the products of the fields, which are of excellent quality. In the low lands, which are devoted to grass, seven crops of hay are secured in a year, and great numbers of cattle are maintained. So far, there has been no instance of illness of any kind traceable to the sewage. The air is so fresh, that, besides the Cadet School, which existed in the neighborhood before the sewerage system was laid out, two convalescent hospitals have already been built in the middle of the irrigation fields, and other establishments of the sort are in contemplation. Typhoid fever, which might be expected occasionally, as all the people on and about the irrigated farms drink the effluent water, is unknown; and the underdraining of the fields has diminished the number of cases of intermittent fever, which was once prevalent in certain portions of the territory. Although the system is not self-supporting, the receipts of the farms are nearly a million dollars a year, and it is not unlikely that in private hands they might be made to give a profit, while

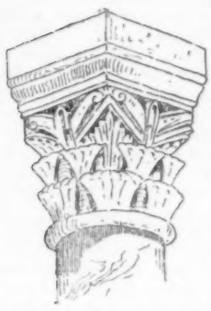
the work of purification is so thoroughly done that at one of the stations the effluent water is collected into a pond, in which trout, perhaps the most sensitive of all fish to impurity of the water in which they live, are successfully raised.

PROFESSOR ROGER SMITH delivered a lecture before the students in Architecture at University College the other day, which, as reported in the English technical journals, is worth reading by all architects. The title of the lecture was "Mistakes in Architecture," but it might just as well have been called "Mistakes in the Conduct of Life," for its substance applies to all professions, as well as that of architecture. In general, Professor Smith condemns carelessness in carrying out professional duties; sharp or doubtful practices, among which he includes the solicitation of employment, and offers to do work at less than the usual rates; want of caution in giving orders, or making and noting contracts, and haste or bad temper in business dealings. Especially does he warn his hearers against writing angry letters, which, as he says, are read in cool blood, and excite lasting resentment where hasty verbal expressions would be readily overlooked. We sometimes think that Talleyrand's rule, "Never write a letter, and never destroy one," is the safest one for a professional man to follow; but as he cannot always avoid expressing himself in black and white, he may with advantage remember a story which Professor Smith tells about Sir Robert Peel, or some other noted statesman: A friend of this hero, whoever he was, had been affronted in some such way as we all are occasionally, and had written a letter in reply to the insult. He had worked hard over the letter, and had concocted a masterpiece of stinging sarcasm, which, after a final polishing, he brought to show to his distinguished patron. The statesman read it through without a word, and then inquired whether any copy had been made of it. On learning that there was no duplicate, he remarked, "Very injudicious letter; much better burn it"; and, to make sure of his advice being followed, he put it in the fire himself, and held it there with the poker until it was consumed.

THE *Engineering and Building Record* publishes an interesting letter in regard to the expansion of ice by heat, which explains a good many phenomena that most people have observed, without being able to account for them. According to the letter, a short railway was once built in the Province of Ontario, which crossed a fresh-water pond, known as Rice Lake, by a bridge two and one-half miles long. The bridge was mostly composed of trestle-work, very strongly built, with uprights driven to a hard bottom, and thoroughly braced. The middle portion, over the deepest part of the lake, was composed of trusses, eighty feet in span, supported by piers, measuring twelve by twenty-four feet, and filled with stones. Early in the first winter after the bridge was built, the lake froze over to a depth of about seven inches. Before snow came to protect the ice, the weather moderated, the sun shone out brightly, the ice expanded, and in a few minutes the bridge was in ruins nearly its whole length, the trestles being pushed over in the direction of the principal expansion. The destruction of the bridge caused the temporary abandonment of the railway, but years afterwards the trestles were repaired and filled in with an embankment of gravel, the top of which is eight feet above the level of the water; yet the expansion of the ice during sunny days is so great that it frequently creeps up the embankment, and, by successive movements, is pushed upon the rails. It is evident that such movements as these of vast sheets of ice, urged by the irresistible force of expansion by heat, are of great importance to those who have to build in places exposed to them, and Mr. Dumble, the author of the letter, made recently some experiments to determine the exact amount of the change of volume under different circumstances. For this purpose he selected a mill-pond near his house, and marked off a certain area of ice, which he kept isolated from the ice about it by a canal eighteen inches wide, kept open by constant attention. Near the ends of the floating block, which was one hundred and three feet long, were set pieces of plank, and on these was laid a long pole, carefully spliced, and resting on rollers. By means of marks on the rod and its supports, any variation in their relative lengths could be immediately observed and measured, and a rough shed was built over the place, to prevent the rays of the sun from falling on the ice, and complicating the effects due to atmospheric temperature. Although there were considerable variations in the weather during the first few days of the experiment, the ice showed no movement until it had attained a thickness of three inches, the explanation of this being undoubtedly, as Mr. Dumble says, that up to this point the ice shared the temperature of the water on which it floated. As it thickened, however, it became very sensitive to heat and cold, reaching its maximum dimensions at a temperature of thirty-two degrees Fahrenheit, and contracting uniformly as the thermometer fell below this as far as four degrees below zero, which was the lowest point reached during the season. So long as the ice, frozen under cover, and perfectly clear and homogeneous, kept its character, the contraction and expansion were at the rate of one-three-hundredth-thousandth of its length per Fahrenheit degree, or about fifteen one-hundredths of an inch in the length of the sheet under observation for a range in temperature from zero to the melting-point of water. During February a thaw took place, and the character of the ice was altered, the surface becoming moist, and the substance probably somewhat spongy. When cold weather returned, the rate of expansion and contraction of the ice was found to have more than doubled, the movement due to a variation of one degree in temperature being now about one-hundredth-and-thirty-one-thousandth of its length, or three-tenths of an inch in the length of the floating mass for a range of thirty-two degrees. This, it must be remembered, was simply the excess of expansion and contraction of the ice over that of the wooden rod, which would also expand and contract, at a rate which Mr. Dumble did not determine, and made no allowance for. Strictly, however, the rate of expansion and contraction of the wooden rod is not far from that of the ice, so that the apparent expansion of the ice, as measured by the rod, was only a fraction of the true movement. According to Brunner, the true coëfficient of expansion of pure ice is three hundred and seventy-five ten-millionths for every degree Centigrade, or about six times as great as Mr. Dumble's uncorrected observations indicated, so that the actual lengthening of his floating cake of ice, if measured by two fixed points, as, for instance, points of rock projecting from the bottom, would have been nearly nine-tenths of an inch, and a sheet of ice a mile long would expand and contract nearly four feet. Moreover, as skaters know, movements of the ice on ponds cause long cracks. These fill with water, which is soon frozen into the mass, increasing its volume, and causing it to creep up the banks, or push with irresistible force against a wall or other structure which may be in its way.

IT is curious to observe how important canal navigation is getting to be abroad, in comparison with its condition here. As every one knows, Manchester, which is only thirty miles from Liverpool, and has unlimited facilities for railway communication with the seaport, has just determined to build, at an enormous expense, a ship-canal to the Mersey, through which ships from New Orleans will be able to convey cotton directly to the factories where it is to be spun and woven. In this country, where it has been seriously proposed to abandon the Erie Canal, on the ground that wheat can be carried more cheaply by railroad trains from Buffalo to New York than by boats on a canal owned and managed by the State, such a scheme as the Manchester Canal, which, besides immense land damages, must be burdened with locks, would seem preposterous; yet the English promoters, after spending more than half a million dollars in surveys and estimates, are convinced that the investment will be profitable, and, judging from the experience of other canals in Great Britain, they are right. The Leeds and Liverpool Canal, which occupies with respect to Leeds much the same position that the new one will in relation to Manchester, pays twenty-one per cent annually in dividends; yet this is a small canal, only four or five feet deep, and thirty feet wide, and is obstructed by a hill, over which boats must climb by means of a chain of locks, ascending to a height of more than eighty-eight feet. It may be that the distances in America are too great for successful internal navigation, and that a highly cultivated farming country, like England or France, gives greater encouragement to the slow and cheap canal traffic than a territory like ours, sparsely settled, and with cities far apart; but in cases where there is to be an obvious and immediate gain, as there would be with the Cape Cod and Florida Canals, experience shows that the value of the work will increase, rather than diminish, with time.

THE TWENTY-SECOND ANNUAL CONVENTION OF THE AMERICAN INSTITUTE OF ARCHITECTS.



THE 22d Annual Convention of the American Institute of Architects began in this city yesterday, about fifty members of the Institute being in attendance. President R. M. Hunt, of New York, presided. The morning session began in the Lecture-room of the Buffalo Library at 10 A. M. After calling the Institute to order, President Hunt delivered his annual address, as follows:

Fellows and Associates of the American Institute of Architects:

When I consider the duties and responsibilites of the position which you have conferred upon me, and recall to mind the ability of my predecessors, it is with feelings of gratification and solicitude that I address you upon this occasion. I beg you to accept my sincere thanks for the honor done me, and, relying upon your indulgence, will submit a few suggestions for your consideration.

But first it is my painful duty to record the loss of our late president, Thomas U. Walter, whose absence at our last convention was noted with profound regret. Mr. Walter was a man of sterling qualities, well fitted to carry out the many important works intrusted to his care. As one of the founders of this Institute he was ever diligent in furthering its aims, while his great experience, sound judgment, and genial manner endeared him to us all. To no one is the Institute more deeply indebted. The Nation, too, owes him a debt of gratitude for the grand monuments from his hand which adorn the Capital. He was a noble example of a life devoted to high professional achievements, even to the sacrifice of personal interests; and let us hope that his claim, now before Congress, will be considered in the same conscientious manner as his services were rendered. We have, furthermore, to deplore the loss of John H. Sturgis and Carl Pfeiffer, Fellows of the Institute, and among its most zealous supporters, whose works testify to their uncommon ability.

During the past year much has been done to elevate the standing of the profession. The many public and private structures throughout the land show marked improvement in design and construction, attesting not only the earnest zeal of the architect, but also the deep interest taken by the public in our art. The higher culture of the public in matters of taste and art has led to certain improvements in that much-vexed question of competition. It is already not unusual to solicit professional aid in those matters, to lay down the rules and award the prizes, so that all that is now required to insure its universal practice is the adhesion of the profession to those principles of self-respect which preclude the practitioner from taking part in any competition not properly organized. This condition of affairs is due in part, also, to the stand taken, for years past, by certain members of the profession who have uniformly declined to respond to invitations to compete, except on proper terms. Such action must eventually command the respect of the public, and ultimately secure the desired end.

An unfortunate event of recent occurrence affords convincing proof, if any were needed, of the necessity of the employment of a clerk-of-the-works on structures of importance, undertaken at distant points. The extra cost of a superintendent is trivial as compared with the risk attending the erection of a building where only an occasional supervision is given. A firm stand taken on this point would undoubtedly insure the employment of a clerk-of-the-works, as is usual in Europe.

It is to be regretted that no signal success has been gained, during the past year, toward the much needed improvement of the method followed by the Federal Government in the design and erection of the public buildings. It would seem as though the mere fact of calling attention to the present method would insure a total reorganization of this department, where so many millions are yearly expended. The wonder is that any person of good professional standing should accept the position of Supervising Architect, so absurd is it to expect any one man — be he ever so gifted — to properly fulfil the varied requirements of that office. Besides, the Nation has a right to expect that the public buildings should be at least fair examples of the architectural talent of the country, while the profession has no less a right to the Government patronage. The establishment of a Department of Public Works, as exists in other countries, would remedy the existing evil.

A standard form of contract — a great desideratum — has been prepared by your committee appointed for that purpose at the last convention, to act in conjunction with similar committees of the Western Association of Architects, and the National Association of Builders. Among other benefits secured by the introduction of a uniform contract, is that of diminishing the chances of misunderstandings arising between the owner and the contractor, and possible consequent litigation.

At the last convention your attention was called to the desirability of members furnishing all the information possible to the board of trustees concerning candidates proposed for admission to the Institute. Too great care cannot be exercised in this matter, as with increased membership our responsibilties multiply. Another important matter which demands your attention is that proper compensation should be provided for the executive officer of the Institute, — the secretary, — whose duties, already very onerous, are daily becoming more so. The reduction of the annual dues a few years since increased our financial difficulties. Might it not be advisable, therefore, under the circumstances, to augment the initiation fee and annual dues of the Fellows, if not of both Fellows and Associates, and might it not be wise to require that all members of the Institute shall be members of some of its Chapters, thereby strengthening the Chapters, and equalizing, while diminishing, the burden on individual members?

Let us now consider briefly the present condition of the profession, noting what has been accomplished, and what remains for us to do. Since the foundation of the Institute in 1857, the standing of the profession has greatly improved. This is due in a great measure, if not chiefly, to the establishment of that good fellowship among its members which has led to professional esteem and healthy rivalry in place of a certain distrust formerly existing among members of the profession personally unacquainted with each other. If no other result had been accomplished, we should have reason to congratulate ourselves. The establishment of mutual respect and personal consideration among the members of the profession has led to the following, among other benefits, to the community, and to the profession, viz.: Progress in architecture, its cognate arts and industries; the establishment of a proper schedule of charges, and improvements in the building laws. While the growing interest in architecture shown by individuals and corporations has led to art publications and the establishment of technological and art schools, still much remains to be done to secure for our noble profession that high position which it justly holds in the Old World. Toward this end, it is of paramount importance that all architectural societies of the country should be under one direction. The old adage "in unity there is strength" is especially applicable to us. Our united efforts to reorganize the Government method in regard to public buildings should be unceasing until crowned with success.

A bill "To establish a National Art Commission" to report on plans for public buildings, monuments, and works of art has passed the Senate and is now before the House of Representatives. It is to be hoped that it may become a law. A similar commission should be established in every community to insure correct designs and good construction. A striking proof of the necessity of such a board is furnished by the present chaotic state of the proposed library at Washington. The Capitol at Albany furnished another example. Such a condition of affairs would hardly have been possible had these buildings, from the start, been intrusted to a competent commission comprising one or more experienced men of our profession. Striking blunders of this sort are of too common occurrence — of buildings costing double the amount proposed to be expended, others unfit oftentimes for their intended uses, etc., and although the architect is not unfrequently blamed for these mistakes, the fault generally is attributable to the incompetency of the committee in charge. The attainment of these two objects is of the greatest importance, and we should do all in our power to accomplish them. It is a duty we owe to the public, who should be ever ready to give us aid and support, and who should rightfully expect us to direct in matters relating to our craft.

A more direct and lively interest should be taken by the profession in the architectural and technical schools, which have already attained to a high degree of excellence under the able direction of those in charge of them. Lectures and conferences by the active members of the profession might accomplish much in the training of those who so soon are to take our places.

In conclusion, we have reason to be satisfied with the results of our past labors. Let us therefore take renewed courage and steadfastly pursue our good work, each and every member remaining loyal to our motto, "Truth and Unity."

The session was devoted to the reading of reports from the officers and the special committees. The special committees submitted reports on these subjects:

On consolidation of architectural societies; on a bill to provide improved methods in the architectural service of the Federal Government, jointly with special committee of the Western Association of Architects; on the uniform building contract, prepared jointly by the Institute, the Western Association of Architects, and the National Association of Builders; on a formula for Chapter reports; on providing a permanent home for the Institute, and on indemnification of Mr. Bloor.

Mayor Becker next delivered a brief address of welcome, tendering the visitors the hospitality and freedom of the city.

The afternoon programme included a trip to Niagara Falls, the visitors being the guests of the Buffalo architects.

In the evening the exhibit of drawings was opened and attracted much attention. A portion of the Fine Arts Gallery was given up for this purpose, and 118 different drawings were exhibited. The largest was a design map of the proposed South Buffalo Park. Several Buffalo architects are well represented. The exhibit of drawings for church interiors, windows, and Tiffany's plans for parlor decorations in Persian, Moorish, and English Renaissance styles are notably fine.

The evening session was given up wholly to a discussion of the report of the special committee on consolidation. Mr. W. W. Carlin of this city is a member of the committee. They submitted a lengthy plan of consolidation of all the architectural associations in the United States, and the convention decided to take up the report and act on it seriatim.

Mr. Adler, of Chicago, President Smith of the Western Association of Architects, and others favored consolidation, and after considerable discussion the first proposition, the name of the proposed federation shall be "The American Institute of Architects," was adopted unanimously. The second proposition was as follows: Any architectural association which shall adopt the "condition of membership" which has prevailed in the old A. I. A., viz., "the honorable practice of the profession," may become part of the new organization. This drew out a very animated and extensive debate, and was not acted upon. Mr. Briggs provoked the discussion on the advisability of consolidation by suggesting that it would be better for the Western Association to come in as individuals.

Mr. Adler, representing the Western society, instantly jumped to his feet and declared that he was a member of both organizations, but that the Western society had three times as many members as

the Institute and had vitality enough to exist without the Institute. The Western Association did not ask, but was asked to join the Institute.

Mr. Briggs feared the new members would dominate the Institute.

Mr. Cutler, of Rochester, thought that Mr. Briggs was mistaken. The Institute had taken the initiative, and was committed to amalgamation.

Mr. Carlin said it would be unfair to compel members of other societies to pay initiation fees.

Mr. Adler said the Western society would not join the present Institute, but was willing to join hands with the Institute and form a confederation, retaining the old name in honor of its age and prestige. The Western society sought a more democratic government than the Institute affords, and would not consent to be ruled by a Board of Managers.

President Hunt, as one of the original founders of the Institute, said they would run a dangerous risk in admitting any association as a body. It took the Institute thirty years to get 200 members, and the Western Association had received a greater membership in three or four years. There would be danger in admitting so large a number.

Messrs. Adler, Gibson, Shipman, Cutler and others debated the matter thoroughly and several resolutions were offered and withdrawn. Finally a resolution, sustaining the action taken at the last annual convention held at Chicago, in favor of forming a confederation, was carried unanimously amid applause. The report was again taken up, and went over as unfinished business.

ANNUAL REPORT OF THE BOARD OF TRUSTEES OF THE AMERICAN INSTITUTE OF ARCHITECTS.

To the American Institute of Architects:

Since the twenty-first Convention, held in Chicago in October of last year, your Board, under the chairmanship in most instances of the President, Mr. Hunt, have held eight regular meetings, two adjourned meetings and one special meeting; their regular time for holding the monthly ones having been changed, to suit the convenience of Western members of the Board, from the third to the first Wednesday of the month.

Mr. Wm. A. Potter having positively refused to accept the Secretaryship for 1888, to which he was elected, Mr. Bloor has so far remained at the post; and Mr. Congdon having declined his re-election as Trustee, the Board, at its first meeting in the current year, appointed Mr. Littell (who has a number of times been elected to and served in that office) to fill the vacancy.

Since the last report of your Board, four (4) Associates, Messrs. Fred. H. Gouge of Utica, N. Y.; Jas. R. Willett, of Chicago; Warren R. Briggs, of Bridgeport, Conn., and F. W. Humble, of Buffalo, have been advanced to the upper grade of membership, and thirteen (13) candidates have been elected Fellows by first election, viz.: Messrs. W. Bleddyn Powell, of Philadelphia; Wm. W. Clay, of Chicago; Geo. F. Hammond, of Cleveland; Will. A. Freret, of Washington, Supervising Architect of the United States Treasury Department; W. W. Carlin, of Buffalo; A. F. D'Oench, of New York, Superintendent of Buildings; Louis De Coppet Berg, of New York; Jas. G. Hill, of Washington, ex-Supervising Architect, United States Treasury Department; Edward Clark, of Washington, Architect in charge of the United States Capitol; Chas. E. Colton, of Syracuse; M. J. Dimmock, of Richmond, Va.; H. A. Macomb, of Philadelphia, and Geo. J. Metzger, of Buffalo. The accessions to the Associateship have been seven (7) in number, viz.: Mrs. Louise Bethune, of Buffalo, and Messrs. S. Gifford Slocum, of Philadelphia; A. C. Elzner, of Cincinnati; Albert H. Kipp, of Wilkesbarre, Pa.; Jno. A. Hamilton, of New York; Willis G. Hale, of Philadelphia, and C. F. Wilcox, of Providence, R. I.

A number of other applications from candidates for professional membership are before the Board, as also letters from various parts of the country, making inquiries in reference to the possible formation of Chapters; several of which are in continuation of correspondence opened by the writers of them last year, but while the question of consolidation is pending, it has not been thought desirable to push the matter of new accessions.

To the list of Honorary Members have been added the names of Charles Chipiez, of Paris, architect and author of several valuable works on architecture and general art, and of Comandatore Rudolfo Lanciani, archæologist and Director of the Excavations in Rome; while Signor Giacomo Boni, of Venice, Architect in charge of the Ducal Palace and the Campanile of St. Mark's, has been enrolled, by first election, among our Corresponding Members; and Mr. Jno. Murdoch, of Baltimore, has been transferred thereto from the Fellowship grade. The first three gentlemen have shown much courtesy to the Willard Commission, now, in connection with the New York Chapter, engaged in adding an Architectural Department to the Metropolitan Museum of Art.

Mr. Murdoch, for many years a Fellow of the Institute and the President of its Baltimore Chapter, and latterly filling the position of Engineer of the Light-House Board, United States Treasury Department, having announced his intention of resigning, on account of devoting himself altogether to engineering practice, your Secretary asked him to reconsider his determination, for the sake of the interests of the Institute and his local Chapter. Mr. Murdoch in his rejoinder improved the occasion to animadvert on what he considered the mischievous action of the Institute in having repealed, some years ago, the law requiring its Associates to be such through the Chapters, instead of, as now, irrespective thereof; the option thus left to candidates causing them, in his opinion, as in that of others, to rest content with a title derived from the Institute at large, and, as concerns the local branch of it, to which they geographically belong, to lose that active interest in it which only would ensure, in maximum degree, the benefits derivable from frequent intercourse between the members of one fraternity. Mr. Murdoch's resignation was accepted with much regret, and it was by an immediate and unanimous vote that his continued, if comparatively slight, connection with the Institute, through the Corresponding Membership, was secured.

The resignation of Mr. E. F. Baldwin, Fellow, of Baltimore, which had been at the disposal of the Board for some time previous, was accepted at its first meeting after the last convention, thus rendering inoperative the instructions issued at that convention with reference to a solution of, and termination to, his controversy with a member in his own locality.

At the last convention the precarious condition of the President of the Institute, Dr. Thomas U. Walter, was a matter of grave concern. Ten days after its close, he died in Philadelphia, his funeral being attended by the President elect, and other members of our organization.

At the first meeting of your Board, Dr. Walter's pupil, Mr. N. Le Brun, and the President of the Philadelphia Chapter, Mr. T. P. Chandler, Jr., were appointed a committee to prepare suitable resolutions in reference to the melancholy event, and this Convention will presently be favored with these resolutions, and with an admirable memoir of Dr. Walter's professional life, prepared by an ex-Secretary of the Institute, Mr. Geo. C. Mason, Jr. At the June meeting was presented a copy received from the Western Association of Architects, of appropriate resolutions passed by that body in memory of Dr. Walter.

The necrological list for the year includes two other names — one that of Mr. Jno. H. Sturgis, a Fellow of the Institute up to his decease, and the other that of a past Fellow, Mr. Carl Pfeiffer. The Board passed suitable minutes in their honor, that of Mr. Sturgis, prepared by Mr. Kendall, as follows:

"The Board of Trustees desires to express its appreciation of the great loss the profession has sustained through the recent death of Mr. Jno. H. Sturgis, at St. Leonards-on-Sea, England.

"Mr. Sturgis, who was one of our early members, and a Fellow for nearly a quarter of a century, always took a deep interest in the welfare of the Institute, and, whenever practicable, was present at its annual conventions, and took an active part in them.

"For many years he was the Vice-President of the Boston Chapter, to whose service he was always ready to devote his social accomplishments and his professional talents.

"His works are characterized by intelligent treatment of mass, and by especial thoughtfulness and refinement of detail, and it may, without hesitation, be said that his influence, from first work to last work, has been increasingly a salutary one; so great, indeed, has it been, that we may well wish to leave to those who follow us, so good and fruitful a record toward the artistic, constructional, executive and social advance of the profession, as Mr. Sturgis has left to us."

The following in memorial of Mr. Pfeiffer was prepared by the Secretary:

"*Resolved*, That the Board of Trustees of the American Institute of Architects have heard with deep regret of the death, five days ago, of Mr. Carl Pfeiffer, for several years a Trustee and, for two years the Secretary of the Institute, and the architect of the Presbyterian Church, cor. Fifth Avenue and Fifty-fifth Street, the Unitarian Church of the Messiah, the Roosevelt Hospital, the Insane Asylum at Middletown, the Colored Orphan Asylum, the Berkshire Apartment-House, and many other important structures."

In both cases the resolutions were forwarded to the widows of the deceased members.

Dr. Walter's widow has endeavored since her husband's decease to collect a claim of his to a large amount against the United States Government for professional services rendered by him in designing and executing the completion of the National Capitol at Washington and a number of other Federal buildings, and your Board, feeling the justice of the claim, has afforded her all the assistance in its power, the Secretary having had much correspondence on the subject with various parties, and sending to all the Chapters suggestions toward influencing a favorable consideration of the subject in Congress. The present status of the matter is that some time ago the Committee on Claims of the House of Representatives reported in favor of a settlement by the payment of a sum considerably less than a quarter of that claimed, and that Mrs. Walter's attorney had advised against further action by the Institute in the matter until it should be taken up in the Senate.

The Secretary has, during the year, been called on to furnish the editors of two well-known cyclopædias with biographical details of American architects, and has furnished them in the cases of parties deceased, but, in the case of living practitioners, has referred his inquirers to the parties themselves.

At an early meeting Messrs. Littell and Kendall were appointed a Special Committee, with power, to make a fitting response to the propositions offered by the promoters of the Grant Monument Com-

petition. They did so in a letter to ex-Governor Cornell, Chairman of the Committee that have the matter in hand (which was acknowledged by Secretary Greener), and copies were forwarded to each Chapter of the Institute. The letter was published generally in the architectural serials, and received the official commendation of several of the Chapters and of the Western New York State Association of Architects.

For the current information of the Board, the Special Committee on Improving the Architectural Service of the Federal Government reported the result of their interview with Mr. Freret, the Supervising Architect of the Treasury Department. This information, in condensed form, will presently be laid before you separately in the report of that Committee.

The services of the Board in settling a dispute between an architect and his client have again been asked for and refused, in accordance with the rule confining advice and adjudication on the part of the Board only to members of the Institute.

The Secretary being informed by another architect that he had recovered by legal process from a recalcitrant client the principal and interest of a bill for partial service to its full amount of nearly $2,000, the architect's charges being made in accordance with the Institute schedule, his opponent's counsel had endeavored to influence the court and jury by making the point that the schedule was the production of a combination of architects existing for the purpose of insisting upon an extortionate rate for services. The Secretary, in his rejoinder to his correspondent, had pointed out that it was very fortunate for him and others that the Institute had so firmly established its prestige and its schedule; that it is an easy thing for a reputable architect and his lawyer — if the latter is sufficiently competent and tenacious — to go into court and collect to the full on its several items, as, also, that the reputation of the *personnel* of the organization is so high that the false charge that it is a combination of architects for the exaction of extortionate rates for professional services has no effect on a jury.

Two of the foreign Honorary Members have enriched the Library of the Institute during the year; one, Mr. P. J. L. H. Cuypers, of Amsterdam, having made it a donation of fifty-eight engravings and wood-cuts, illustrating eighteen churches designed and executed by himself in various localities in Holland; the other, Professor Gottgetreu, of Munich, contributed a copy of his "*Lehrbuch der Hoch Konstruktionen*," with accompanying atlas. The American Society of Civil Engineers, the Royal Institute of British Architects, and the *Société Centrale des Architectes* continue to forward their transactions; while copies of architectural and engineering serials are regularly received from various points in Europe, and one from the East Indies.

A letter from Secretary Normand S. Patton of the Western Association of Architects, on behalf of that Association's Committee on the Metric System, advocating its use for weights and measures, and referred by the last Convention to your Board with power, has several times been presented, laid on the table, taken up at a subsequent meeting, and occasioned some discussion, but without further result.

To your Secretary was referred, by a member of the Institute, a letter from a clergyman connected with the proposed Babylonian Expedition, and asking where a young architect might be found who would be willing to accompany the expedition as architect, without salary and at his own expense. The Secretary communicated his request to several parties, but without result.

At the June meeting the Board appointed two of its members, Messrs. Littell and Bloor, to act as a Committee of Arrangements for the current convention, to be held in Buffalo, preferably in the third week in October, and at the September meeting Mr. Carlin was appointed local coadjutor thereon.

Your Board would call the attention of the Convention to the fact that the experiment of a reduction of the dues made some years ago has not proved to be a financial success, and that, in order to properly perform the work of the Institute, the revenue should be at least double the amount that it is at present. It is well known that the dues of other like associations are greatly in excess of those of the Institute.

This convention will probably yield to no previous one in the importance, so far as Associative interests are concerned in the questions that will come up for discussion, and it is to be fairly expected that they will meet in that broad public spirit which can alone deal with themes involving more than local conditions and individual preferences.

Respectfully submitted for the Board of Trustees by

A. J. BLOOR, *Secretary.*

October 17, 1888.

REPORT OF P. L. LE BRUN, ESQ., AGENT OF THE WILLARD ARCHITECTURAL COMMISSION.

NEW YORK, October 10, 1888.

To Messrs. N. Le Brun, Pres., A. J. Bloor, Sec., and Emlen T. Littell, Willard Architectural Commissioners:

Gentlemen,— I have at last the honor to report to you that the installation of the Willard Architectural Collection in the main hall of the older portion of the Metropolitan Museum of Art is a matter of the immediate future, and only awaits the transfer of the objects lately exhibited there to their spacious new quarters in the enlarged museum.

The overcrowded condition of that institution for years past, necessitated the postponement of the selecting and purchasing of the casts, until provision was assured for their proper disposition and display. This enforced delay has, however, been of advantage to the fund, placed at your disposal by the terms of the bequest, in the accumulation of four years' interest on the money devised. It has also permitted a more deliberate maturing of the work of selection.

The construction of the Museum additions having apparently progressed last autumn sufficiently to warrant the purchasing of casts, your agent made his second trip to Europe, under your direction, for this purpose. Of the casts he then secured, the larger portion, or two hundred and fourteen cases, have arrived — leaving about eighty cases yet to come.

These boxes remain still unopened in the cellars of the Museum, owing to the lack of space required for properly distributing and sorting their contents and putting together the larger objects, which are mostly shipped in many parts, requiring a careful readjustment. And, as it is the intention of the Museum authorities to reopen their collections to the public with the inauguration of their new extension, about the middle of December next, it will be impossible within that limited time to mount and prepare the Willard casts for exhibition. Much as this is to be regretted, it seems to have been unavoidable.

Since my last report, the Museum has added the West Court — formerly devoted to the modern sculpture — to the uses of the Willard Collection. This and the placing of the principal entrance to the Architectural Court in the centre of the south side of the main room have brought about a few unimportant shiftings of the arrangement outlined in that report, but its main features will remain the same, and the collection will be distributed likewise with a view to its extension northward, when the additions on that side are built — as will be inevitably required in the future.

Within the limits of this communication it will be unnecessary to allude specifically to any but some of the more prominent objects thus far purchased. In the scheme of the collection, typical models of entire buildings, made to a sufficiently large scale to permit of the accurate reproduction of detail, were assigned an important position. They are to form central crowning illustrations of the peculiar features of each important style, around which are to be grouped castings of detail, photographs and works of reference.

A number of estimates were obtained from specialists, and contracts were made with a skilled sculptor of Paris for the production (as a commencement) of models of the Parthenon, and of the Cathedral of Paris, made to the uniform scale of one-twentieth full size.

They are well-advanced, and from photographs lately received of the portions already finished, promise to be very successful. In these models, all the applied sculptures and carving are to be faithfully reproduced. Of Nôtre Dame Cathedral the exterior only will be shown, but of the Parthenon both the exterior and interior will be equally finished.

The architectural fidelity of these models may be estimated, when it is stated that they are being made under the direct supervision of that distinguished French architect, Monsieur Charles Chipiez, who stands among the first of living authorities on architectural archæology and history. This gentlemen, with a generosity and fraternally artistic feeling that cannot be too highly appreciated, placed his services, on my application, at the disposition of the Willard Commission, and has supplied the sculptor with the drawings necessary to elucidate doubtful points in the construction of the Parthenon, as to which temple he has made extended special and original researches in connection with his work (in collaboration with Monsieur Perrot) on the forthcoming volume of their "*Histoire de l'art dans d'Antiquité.*" His solution of the disputed points as to the manner of admitting the light to the interior, and of the external and internal polychromy of the building, will prove most interesting and valuable. And we may confidently share his expressed hope, that the Willard model of the Parthenon "will give of that superb edifice, which is so capital for instruction, an exact and complete idea; and that it will produce a certain impression on the public." To heighten the realistic effect of the work, in addition to the reproduction of the Phidian statue of Athene Parthenos, the temple will contain a number of portable votive offerings and other artistic treasures, lists of which have been handed down to us.

The educational value of such an exhibit may be estimated, when it is pictured surrounded by casts of the various architectural members of the building, the large pedestal of the model hung with restorations in tint and black and white, and photographic views, the reference library near at hand, with the standard works of Michaelis, Bötticher and Penrose and others. And in a contiguous court (provided by the munificence of Mr. Marquand) a complete collection of casts of every known fragment of sculpture of this noblest edifice, friezes, metopes and pediments. Could the study of its subtle æsthetic beauties be possibly better facilitated?

As to the magnificent model of the cathedral of Nôtre Dame, its execution will be facilitated greatly by the sculptor's access to the numerous drawings and studies of Viollet-le-Duc — made at the time of the restoration of this building — drawings which the kindness of the diocesan architect has placed at his disposition. All the sculptures, in the round and in relief, and the carving will be rendered with as strict accuracy as the scale admits; and the photographs of

the lowest section of the façade, with its rich, deeply recessed triple portals and the gallery of kings above, when compared with photographs taken directly from the building, show a remarkable fidelity to the original, not only in the general feeling, but in the minuter details of the sculpture.

As to the "bits," — among the larger pieces are a full-sized reproduction or cast of the Erectheion Portico of the Caryatides; a model of the Choragic monument of Lysicrates, one-tenth full size; one complete bay of the Cloister of St. John Lateran, with the mosaics colored as in the original; the pulpit front of Sant' Ambrogio, at Milan; the celebrated choir-screen of St. Michael's, at Hildesheim; the interesting carved wooden doorways of Aal and Flaa, Norway; the pulpit of Siena Cathedral; the Shrine of Saint Sebaldus, Nuremburg; the doorway of the large hall in the Palazzo Vecchio, Florence; the tabernacle of Sta. Maria in Trastevere; Monument of Count Bougival, at Breda; Jean Goujon's doorway from St. Maclou, Rouen; a model of the façade of the Knockenhauer Amsthaus (called the finest carved wooden building in Germany), made in finest style at one-tenth scale, and colored as in the original.

Numerous smaller bits have been also secured to the number of about nine hundred and fifty. But the work of selecting and purchasing may be said to be only fairly begun. The casts already bought represent but a portion — the bony framework, as it were — of what will eventually form the Willard Collection, whose formation will be necessarily the work of time. The completing of the series of models alone will take several years.

The commencement which this report outlines should, however, prove a sturdy start in a most important undertaking, and should wake up architects and artisans and the architecture-loving public of New York to a realizing sense of the duties which the inauguration of such a collection imposes — the duty, profit and pleasure of study — the duty and privilege of patronizing and enlarging its scope. For, to carry out fully the ambitious programme of its initiator and public-spirited testator, the means yet unexpended will, from present indications, be exhausted before the Willard Collection acquires such organic completeness and rounded fulness as will make of it truly *an historical epitome of the art.*

Very respectfully, your obedient servant,

P. L. Le Brun.

Illustrations

[Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.]

SEVER HALL, CAMBRIDGE, MASS. H. H. RICHARDSON, ARCHITECT.

[Gelatine Print, issued only with the Imperial Edition.]

THE REJECTED DESIGN FOR THE CONGRESSIONAL LIBRARY, WASHINGTON, D. C. MR. J. L. SMITHMEYER, ARCHITECT, WASHINGTON, D. C.

THE design contemplates a structure in the Cinquecento style, built opposite the south wing of the United States Capitol, and about one thousand (1,000) feet to the east of it. The site is nearly five hundred and seventy-five (575) feet square, and the building is about four hundred and sixty (460) feet by three hundred and thirty-seven (337) feet.

Its capacity for storing books, when the outer rooms will have been filled with books, is estimated at from seven (7) to eight (8) million volumes, at the rate of eight books per foot. Until then, these rooms may serve as galleries for the exhibition of articles of the graphic arts in the Copyright Department, and also as a nucleus for the collection of a future National Art Gallery. The central reading-room is one hundred (100) feet in diameter, is octagonal in form, and covered with a dome-shaped roof of iron and terra-cotta. It is lighted by large windows in the sides of the octagon, and by a large sky-light in the dome. The proportion of the illuminating surface to the space illuminated is as one (1) to one hundred and ninety (190). The walls around the reading-room are provided with alcoves, which will hold two hundred and sixty thousand (260,000) volumes. This room connects with the adjacent book repositories. There will be a spacious gallery for spectators all around that room, above the alcoves, which is a height sufficiently above the floor of the reading-room not to disturb the readers and students below.

The entire building will be absolutely fireproof. Each book repository will be isolated from the others by heavy walls and double-thick iron doors filled with asbestos. The building will be heated by steam and ventilated by the down-draught system, which prevents the heat and dust from rising and accumulating in the upper strata of the rooms and on the upper book-shelves. The floors will be in marble and tiles, and the roofs, floor-beams, galleries, book-racks, etc., will be of iron.

The book-shelves will be of rubbed slate. No combustible materials will be used in the library proper. The arrangements of rooms, their sizes, etc., are strictly in keeping with the "Prospectus" prepared in 1872 by the Commission of Judges appointed by Congress to sit in judgment of the plans submitted to competition by twenty-eight architects from the United States and England. This Commission was composed of Senators Morrill and Howe and A. R. Spofford, Librarian of Congress. This Commission selected at that time the design of Architects Smithmeyer and Pelz as the best. It has since passed through the ordeal of a limited competition with three selected competitors, and an open and continuous one with thirteen competitors, lasting for several years, and resulting in its final adoption by Congress in 1886, and in the commencement of its erection.

As soon as the transfer of the property purchased by the Government for the library site was effected, actual work was commenced. The drainage of the site was at once laid, the excavations were made for the cellar and trenches, concrete work was done, and a large quantity of the dimension stone for the cellar walls was delivered on the premises, ready for putting into the structure.

At this stage of progress Congress abolished the Commission, rescinded all former acts and contracts bearing on this subject, stopped all work, and placed the entire management in the hands of the Chief of Engineers, U. S. A., who was authorized to prepare a new design for a building, the entire cost of which is to be limited to four million dollars ($4,000,000), exclusive of the five hundred thousand dollars ($500,000) already appropriated and partly expended.

HOUSE OF A. J. KENNEDY, ESQ., MINNEAPOLIS, MINN. MR. L. S. BUFFINGTON, ARCHITECT, MINNEAPOLIS, MINN.

BEARING POWER OF SOILS.

IT is scarcely necessary to say that soils vary greatly in their bearing power, ranging, as they do, from the condition of hardest rock, through all intermediate stages, to a soft or semi-liquid condition, as mud, silt, or marsh. The best method of determining the load which a specific soil will bear is by direct experiment; but good judgment and experience, aided by a careful study of the nature of the soil — its compactness and the amount of water contained in it — will enable one to determine with reasonable accuracy its probable supporting power. The following data are given to assist in forming an estimate of the load which may safely be imposed upon different soils:

Rock. — The ultimate crushing strength of stone, as determined by crushing small *cubes*, ranges from 180 tons per square foot for the softest stones — such as are easily worn by running water or exposure to the weather — to 1,800 tons per square foot for the hardest stones. The crushing strength of slabs, *i. e.*, of prisms of a less height than width, increases as the height decreases. A prism one-quarter as high as wide is two or three times as strong as a cube of the same material. If a slab be conceived as being made up of a number of cubes placed side by side, it is then easy to see why the slab is stronger than a cube. The exterior cubes prevent the detachment of the disc-like pieces from the sides of the interior cubes; and hence the latter are greatly strengthened, which materially increases the strength of the slab. In testing cubes and slabs, the pressure is applied uniformly over the entire upper surface of the test specimen; and, reasoning by analogy, we may then conclude that when the pressure is applied to only a small part of the surface, as in the case of foundations on rock, the strength will be still further increased.

That a unit of iron has a much greater power of resistance when it forms a portion of a larger mass than when it is isolated in the manner customary in making experiments on resistance to compression, is conclusively proven by the following experiment: A one-inch round bar of soft Lowmoor iron, eight or nine inches long, was planed on two opposite sides to a thickness of three-fourths of an inch, and pressure was applied on one side of it with a steel die one-half an inch square. The compressive strength of the iron, as determined in the usual manner, was 27,000 pounds per square inch; but, under the conditions stated, a load of 53,760 pounds per square inch was required to produce the slightest perceptible indentation, and 89,600 pounds per square inch produced an indentation only about one sixty fourth of an inch deep. Essentially the same thing is shown by everyday railroad practice. The pressure at the point of contact

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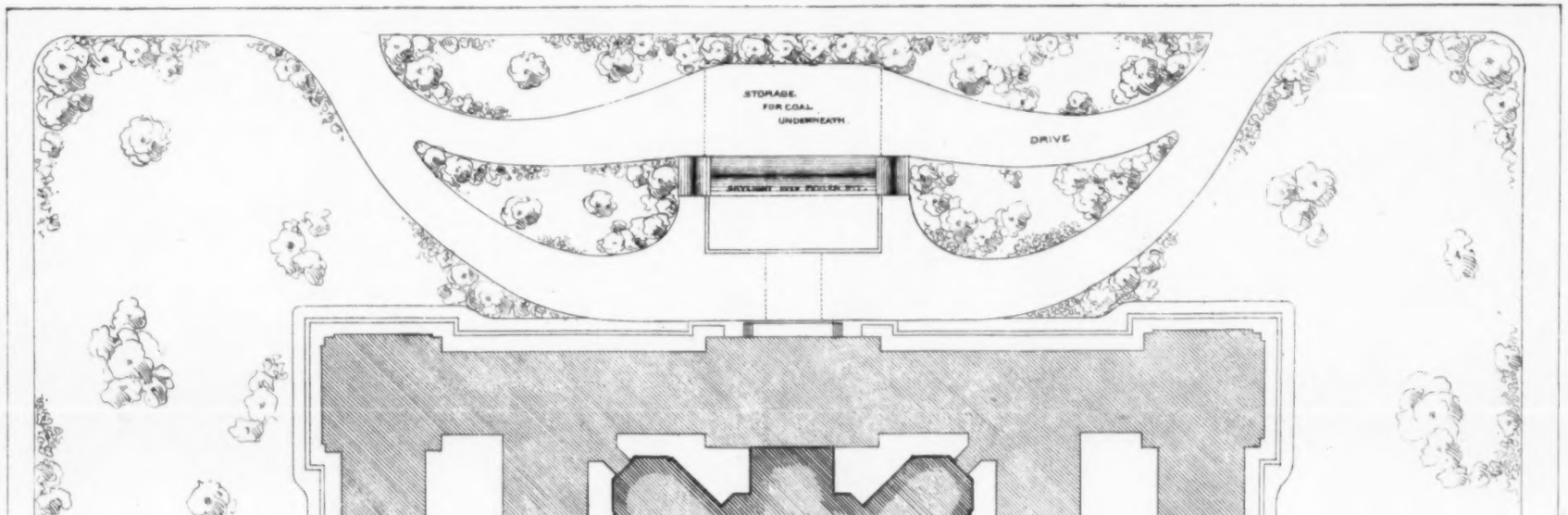
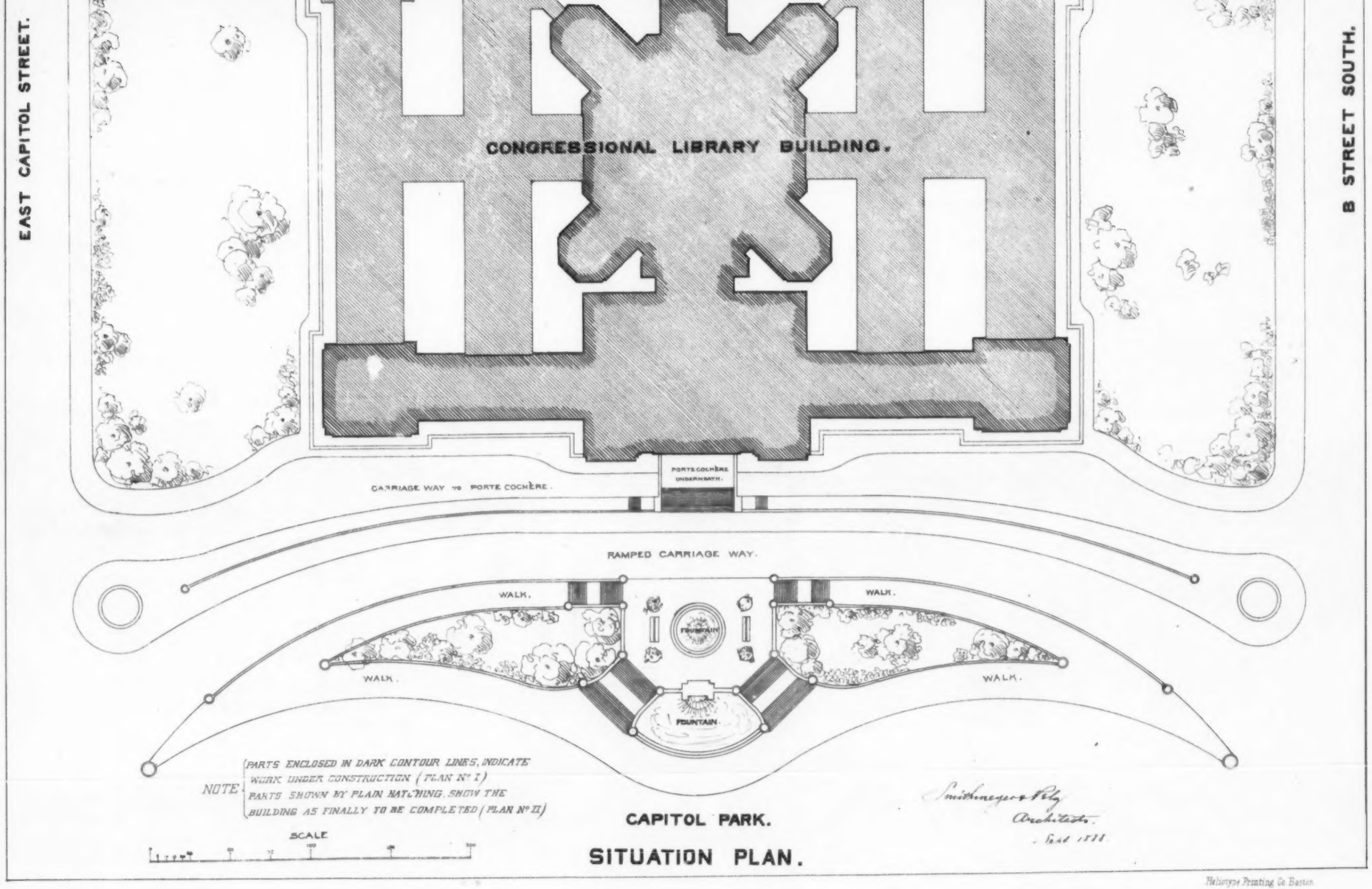
DESIGN OF THE CONGRESSIONAL LIBRARY BUILDING, WASHINGTON, D.C.
AS REVISED FOR EXECUTION.

SMITHMEYER & PELZ, ARCHITECTS.





NOTE { PARTS ENCLOSED IN DARK CONTOUR LINES, INDICATE WORK UNDER CONSTRUCTION (PLAN N° I)
PARTS SHOWN BY PLAIN HATCHING, SHOW THE BUILDING AS FINALLY TO BE COMPLETED (PLAN N° II)

SCALE

CAPITOL PARK.

SITUATION PLAN.

Smithmeyer & Pelz
Architects.
Sept 1888

Heliotype Printing Co Boston

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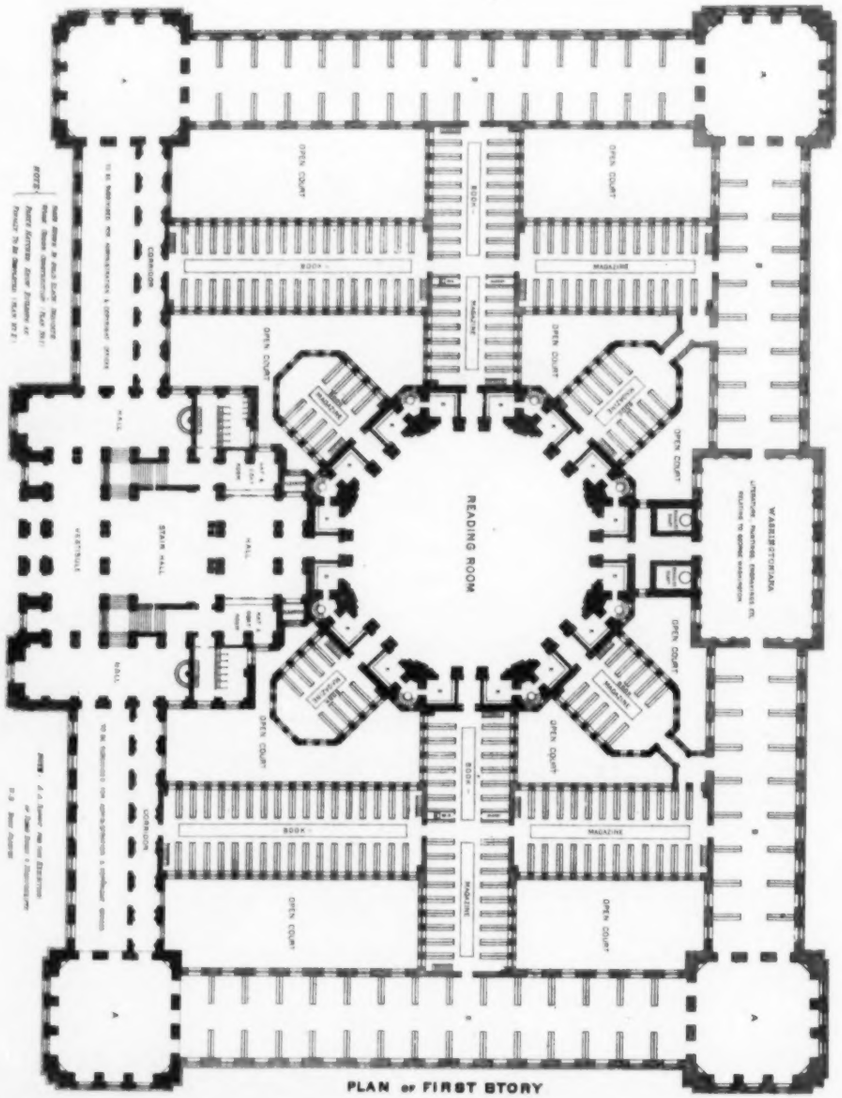
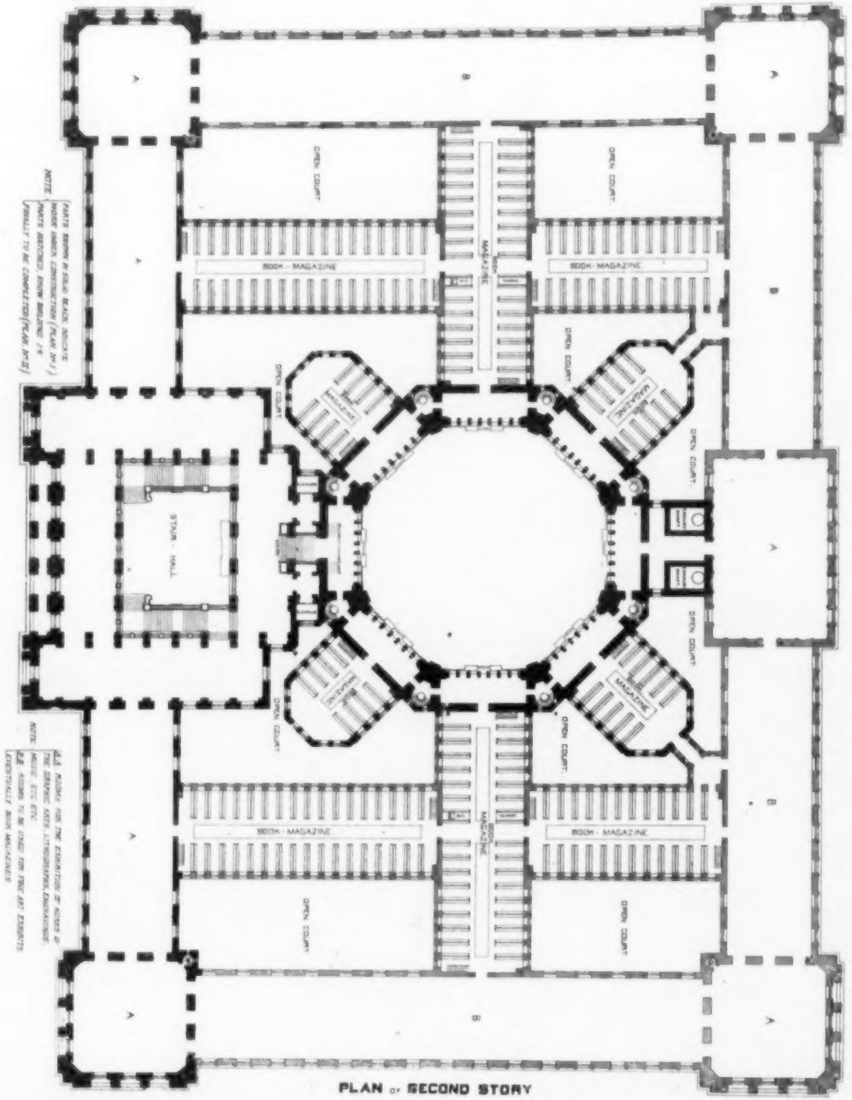
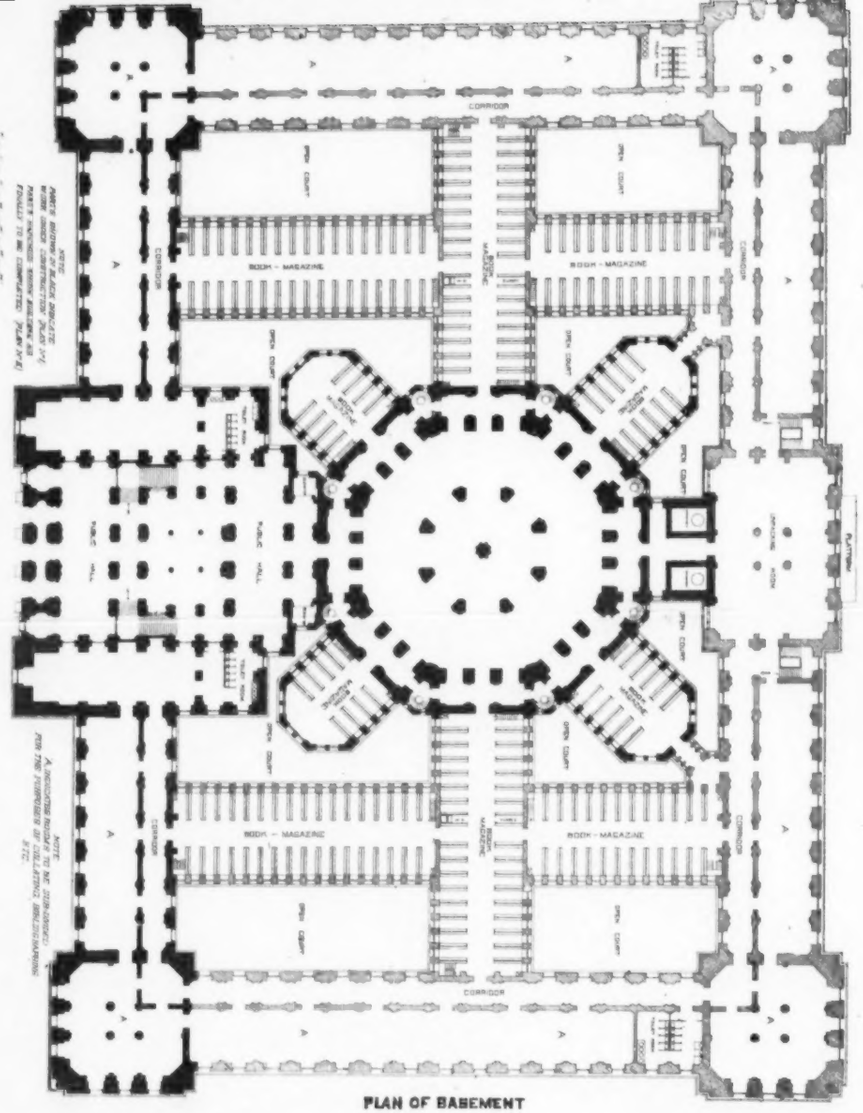


PLAN OF FIRST STORY



PLAN OF SECOND STORY

CONGRESSIONAL LIBRARY BUILDING


BOOK - MAGAZINE
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CONGRESSIONAL LIBRARY BUILDING

Smithmeyer & Pelz Architects. VIEW OF ONE OF THE CORRIDORS OF FIRST STORY

Sep. 1888.

Heliotype Printing Co. Boston.

AMERICAN ARCHITECT AND BUILDING NEWS, NOV. 3 1888 No. 671

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L·S·BUFFINGTON ARCHITECT
MINNEAPOLIS MINN·Æ·1888

RESIDENCE·OF·A·G·KENNEDY·· MINNEAPOLIS

Heliotype Printing Co. Boston.

between the drive-wheels and the rails is, at least, twice the compressive resistance of the metal in the rail, and yet the latter is not even indented, however long the wheel may remain at rest.

Clay, which for years has safely carried one and one-half to two tons per square foot (twenty to twenty-eight pounds per square inch), when tested in the form of cubes, crushed under four to eight pounds per square inch.

Therefore, we conclude that the compressive strength of cubes of a stone gives little or no idea of the ultimate resistance of the same material when in thick layers in its native bed.

The safe bearing power of rock is certainly *not less* than one-tenth of the ultimate crushing strength of *cubes;* that is to say, the safe bearing power of solid rock is *not less* than eighteen tons per square foot for the softest rock, and 180 for the strongest. It is safe to say that almost any rock, from the hardness of granite to that of a soft, crumbling stone, which is easily worn by exposure to the weather or to running water, when well bedded, will bear the heaviest load that can be brought upon it by any masonry construction. It scarcely ever occurs in practice that rock is loaded with the full amount of weight which it is capable of sustaining, as the extent of base necessary for the stability of the structure is generally sufficient to prevent any undue pressure coming on the rock beneath.

Clay. — The clay-soils vary from slate or shale, which will support any load that can come upon it, to a soft, damp clay, which will squeeze out in every direction when a moderately heavy pressure is brought upon it. Foundations on clay should be laid at such depths as to be unaffected by the weather, since clay, at even considerable depths, will gain and lose considerable water as the seasons change. The bearing power of clayey soils can be very much improved by drainage, or by preventing the penetration of water. If the foundation is laid upon undrained clay, care must be taken that excavations made in the immediate vicinity do not allow the clay under pressure to escape by oozing away from under the building. When the clay occurs in strata not horizontal, great care is necessary to prevent this flow of the soil. When coarse sand or gravel is mixed with the clay its supporting power is greatly increased, being greater in proportion as these materials are greater. When they are present to such an extent that the clay is just sufficient to bind them together, the combination will bear as heavy loads as the softer rocks.

The following data on the bearing power of clay will be of assistance in deciding upon the load that may safely be imposed upon any particular clayey soil: From the experiments made in connection with the construction of the capitol at Albany, N. Y., the conclusion was drawn that the extreme supporting power of that soil was less than six tons per square foot, and that the load which might be safely imposed upon it was two tons per square foot. "The soil was blue clay, containing from 60 to 90 per cent of alumina, the remainder being fine siliceous sand. The soil contains from 27 to 43, usually about 40, per cent of water; and various samples of it weighed from 81 to 101 pounds per cubic foot." In the case of the Congressional Library, the ultimate supporting power of "yellow clay mixed with sand" was 13½ tons per square foot, and the safe load was assumed to be 2½ tons per square foot. Experiments made on the clay under the piers of the bridge across the Missouri, at Bismarck, with surfaces 1½ inches square, gave an average ultimate bearing power of fifteen tons per square foot.

The stiffer varieties of clay, when kept *dry*, will safely bear from four to six tons per square foot; but the same clay, if allowed to become saturated with water, cannot be trusted to bear more than two tons per square foot. At Chicago, the load ordinarily put on a thin layer of clay (hard above and soft below, resting on a thick stratum of quicksand) is 1½ to 2 tons per square foot; and the settlement, which usually reaches a maximum in a year, is about one inch per ton of load. Experience in central Illinois shows that, if the foundation is carried down below the action of the frost, the clay subsoil will bear 1½ to 2 tons per square foot without appreciable settling. Rankine gives the safe load for compressible soils as 1½ to 1¾ tons per square foot.

Sand. — The sandy soils vary from coarse gravel to fine sand. The former, when of sufficient thickness, forms one of the finest and best foundations; and the latter, when saturated with water, is practically a liquid. Sand when dry, or wet sand when prevented from spreading laterally, forms one of the best beds for a foundation. Porous, sandy soils are, as a rule, unaffected by stagnant water, but are easily removed by running water; in the former case they present no difficulty, but in the latter they require extreme care at the hands of the constructor.

Compact gravel or clean sand, in beds of considerable thickness, protected from being carried away by water, may be loaded with 8 to 10 tons per square foot with safety. In an experiment in France, clean river-sand, compacted in a trench, supported 100 tons per square foot. Sand well cemented with clay and compacted, if protected from water, will safely carry 4 to 6 tons per square foot.

The piers of the Cincinnati suspension-bridge are founded on a bed of coarse gravel 12 feet below low water, although solid limestone was only 12 feet deeper; if the friction on the sides of the pier be disregarded, the maximum pressure on the gravel is 4 tons per square foot. The piers of the Brooklyn suspension-bridge are founded 44 feet below the bed of the river, upon a layer of sand 2 feet thick resting upon bed-rock; the maximum pressure is about 5½ tons per square foot.

At Chicago, sand and gravel about 15 feet below the surface are successfully loaded with 2 to 2½ tons per square foot. At Berlin the safe load for sandy soil is generally taken at 2 to 2½ tons per square foot. The Washington Monument, Washington, D. C., rests upon a bed of *very* fine sand 2 feet thick underlying a bed of gravel and boulders, the ordinary pressure on certain parts of the foundation being not far from 11 tons per square foot, which the wind may increase to nearly 14 tons per square foot.

Semi-liquid Soils. — With a soil of this class, as mud, silt, or quicksand, it is customary (1) to remove it entirely, or (2) to sink piles, tubes, or caissons through it to a solid substratum, or (3) to consolidate the soil by adding sand, earth, stone, etc. Soils of a soft or semi-liquid character should never be relied upon for a foundation, when anything better can be obtained; but a heavy superstructure may be supported by the upward pressure of such a soil, in the same way that water bears up a floating body.

According to Rankine, a building will be supported when the pressure at its base is $w h \left(\frac{1+\sin x}{1-\sin x}\right)^2$ per unit of area, in which the expression w is the weight of a unit volume of the soil, h is the depth of immersion, and x is the angle of repose of the soil. If $x = 5°$, then according to the preceding relation the supporting power of the soil is $1.4\ w\ h$ per unit of area; if $x = 10°$, it is $2.0\ w\ h$; and if $x = 15°$, it is $2.9\ w\ h$. The weight of soils of this class, that is, mud, silt, and quicksand, varies from 100 to 130 pounds per cubic foot. Rankine gives this formula as being applicable to any soil; but, since it takes no account of cohesion, for most soils it is only roughly approximate, and gives results too small. The following experiment seems to show that the error is considerable. A 10-foot square base of concrete resting on mud, whose angle of repose was 5 to 1 [$x = 11\frac{1}{2}°$], bore 700 pounds per square foot. This is 2½ times the result by the above formula, using the maximum value of w.

Large buildings have been securely founded on quicksand by making the base of the immersed part as large, and at the same time as light, as possible. Timber in successive layers, or grillage on piles, is generally used in such cases. This class of foundations is frequently required in constructing sewers in water-bearing sands, and though apparently presenting no difficulties, such foundations often demand great skill and ability.

It is difficult to give results of the safe bearing power of soils of this class. A considerable part of the supporting power is derived from the friction on the vertical sides of the foundation; hence the bearing power depends in part upon the area of the side surface in contact with the soil. Furthermore, it is difficult to determine the exact supporting power of a plastic soil, since a considerable settlement is certain to take place with the lapse of time. The experience at New Orleans with alluvial soil, and a few experiments that have been made on quicksand, seem to indicate that with a load of ½ to 1 ton per square foot the settlement will not be excessive.

Summary. — Gathering together the results of the preceding discussion, we have the following table:

BEARING POWER OF SOILS.

KIND OF MATERIAL.	Bearing Power in tons per sq. ft	
	Min.	Max.
Rock — the hardest — in thick layers, in native bed	200	
Rock equal to best ashlar masonry	25	30
Rock equal to best brick masonry	15	20
Rock equal to poor brick masonry	5	10
Clay on thick beds, always dry	4	6
Clay on thick beds, moderately dry	2	4
Clay soft	1	2
Gravel and coarse sand, well cemented	8	10
Sand, compact and well cemented	4	6
Sand, clean, dry	2	4
Quicksand, alluvial soils, etc.	0.5	1

Conclusion. — It is well to notice that there are some practical considerations which modify the pressure which may safely be put upon the soil. For example, the pressure on the foundation of a tall chimney should be considerably less than that of the low massive foundation of a fireproof vault. In the former case a slight inequality of bearing power, and consequent unequal settling, might endanger the stability of the structure; while in the latter no serious harm would result. The pressure per unit of area should be less for a light structure subject to the passage of heavy loads — as, for example, a railroad viaduct — than for a heavy structure, subject only to a quiescent load, since the shock and jar of the moving load are far more serious than the heavier quiescent load.

IRA O. BAKER, C. E.

KHOJA AHRAR MOSQUE AT TASHKEND. — The *Turkestan Gazette* gives the following account of the opening of the restored mosque of Khoja Ahrar in Tashkend, said to be over 400 years old: "The opening ceremony of this mosque, restored by the Russian Government, was held in the presence of Gen. Rosenbach, Governor-General of Turkestan. After the religious function the Imam of the parish gave an address, describing the benefits conferred by the Russian Government, and stating that never had the native population of Turkestan enjoyed so tranquil and prosperous an existence as now. He concluded by asking the Mohammedans present to join in a prayer for the Czar. This the audience did, raising their arms."

WITH THE BRITISH ASSOCIATION AT BATH.

THE monotony of the Bath off-season has been relieved by the annual meeting of the British Association for the Advancement of Science, which has been numerously attended, the old Roman city of Aquæ Solis, with its numerous archæological associations and picturesque surroundings, presenting a complete contrast from the busy hum of last year's meeting at Manchester.

In his inaugural address, the new President, Sir Frederick Bramwell, C. E., reminded his hearers that science cannot be made useful to mankind without being applied; that the business of the civil engineer was to apply the discoveries of the scientists, and that, in this application, success greatly depends on the attention paid to the minutest details.

The great feature of the meeting was Professor Ayrton's address on the "Electrical Transmission of Power," the various applications of which — lighting, signalling, propulsion, welding, etc. — were exemplified by brilliant and thoroughly successful experiments. Not only did the Professor weld iron and steel bars by the electric current, but even that refractory metal, aluminium. In speaking of electric lights, he said: "We laugh a good deal at the rough-and-ready manner adopted on the other side of the Atlantic, but every English engineer who has travelled in America comes back fully impressed with the enterprise of the people and their happy-go-lucky success. They have twenty-two electric tramways, carrying some four million passengers annually, to our four electric tramways. The American plan of basing a conclusion on experience, rather than on anticipation, is not a bad one; and, if we follow that plan, taking into account that there are 75,000 arc-lamps alight every night on the Thomson-Houston high-potential circuits throughout the world, and the comparatively small number of people that have suffered in consequence — not one outside the staff — we are compelled to conclude that high potential now is what thirty miles an hour was half a century ago — uncanny, rather than dangerous."

Professor Bonney's lecture on "The Foundation Stones of the Earth's Crust" dwelt chiefly with the structural character of the gneissic and schistose rocks of the Laurentian and Huronian systems of Canada, and of the pre-Cambrian period of the British Isles, which were considered to have been formed under peculiar conditions incidental to the first deposits of sedimentary strata upon the still hot material of the previously fluid globe. The lecture was illustrated by microscopic enlargements of rock-sections about a quarter of an inch in diameter. Sir John Lubbock, Bart., lectured to the operative classes on the "Customs and Ideas of Savage Races."

There were two *soirées* in the Assembly Rooms, one given by the Mayor, and the other by the Organizing Committee. The latter was particularly successful, as a great number of microscopes were shown by their makers. Edison's phonograph formed a great attraction all through the meeting, members, especially the fairer portion, patiently waiting their turn for hours together, as only a certain number were admitted at a time.

In the Zoological Department of the Biological Section, Professor Marsh, who has devoted the greater part of his life to the exhumation and restoration of the remains of numerous extinct animals found in the Western States of America, gave an interesting account of the nearly complete restoration which he had been able to make of the *Brontops robustus*, or Cuban horse, an animal allied to the modern rhinoceros, and a life-size sketch of which he exhibited.

In the Geographical Section, presided over by Colonel Sir Charles Wilson, the Rev. J. Mackenzie, missionary traveller, suggested several explanations of Stanley's silence; and Sir F. De Winton reassured the members by naming the many obstructions to intelligence arriving from the interior of the Dark Continent. Mr. H. J. Mackinder gave an outline of M. de Lesseps's paper on the Panama Canal, which it was proposed to open early in 1890 with ten locks, to be afterwards superseded by excavation when the traffic should afford sufficient funds.

To the Economical and Statistical Section, Mr. M. G. Mulhall contributed a paper on "The Growth of American Industries and Wealth," in which he showed that the development of the States since 1850 — a single generation — was unparalled in the history of nations, the increase of wealth in thirty years being 514 per cent.

The paper which caused the greatest amount of interest in Section G, Mechanical Science, was that on "Underground Railway Communication in Great Cities," by Colonel Rowland R. Hazard of the United States Army, Chairman of the New York Underground Railway Company. Colonel Hazard advocated the formation, immediately under main thoroughfares, of subways, the foundation of which would be a two-foot bed of concrete about twelve feet below the surface of the roadway. On this would be erected the external boundary walls and five rows of steel columns, tied together and supporting the buckle-plates of the roof, covered-in by two inches of Trinidad asphalt; the space between the columns longitudinally to be filled in by panels of "ferflax," composed of steel wire and compressed vegetable fibre. In this way are afforded four lines of track for up and down, fast and slow traffic, and also two galleries for sewers, gas and water pipes, electric leads, etc. The advantages claimed are a minimum of excavation, a maximum of capacity, the greatest number and more equal distribution of points of support, and consequent maximum strength and stiffness. Sir Frederick Bramwell eulogized the paper, commented upon it at length, and concluded by proposing a hearty vote of thanks to the author, which was carried unanimously.

On Saturday, half-day excursions were made to the Severn Tunnel; to the New Barry Dock in South Wales; to Berkeley Castle and Church; to Bristol, Clifton, and the Avon Gorge, and other places of interest. One party visited the Roman camp at Sodbury, and another the Saxon church of St. Laurence, at Bradford-on-Avon, founded by Saint Aldhelm, Abbot of Malmesbury and first Bishop of Sherborne, A. D. 705. The church consists of a nave 25′ 2″ by 13′ 2″, and 25′ 5″ high from floor to the wall-plate; a chancel 13′ 2″ by 10′, and 18′ 4″ high, and a north porch. The building had received modern additions, and was used as a school until "discovered" by the late Canon Rich-Jones, Vicar of Bradford. The chancel window is as perfect as when first erected. This is not a bad testimonial to the weathering properties of Bath stone, confirmed by the wonderful preservation of Laycock Abbey, visited by another party of members. This structure, called Locus Beatæ Mariæ, was founded in 1232 by Ela, Countess of Salisbury, whose monumental stone, with inscription in Latin hexameters, is still to be seen in the fine cloisters. The Abbey is now used as a residence, and was shown by its owner, C. H. Talbot, J. P., whose father had more to do with the invention of photography than he has had the credit for.

There is documentary evidence that Laycock Abbey was built of stone from the Box Hill Quarry, which was inspected by this section of the visitors. Bath stone, though it has been used for building in the neighborhood since the eighth century, was not worked for more than local consumption until the driving of the Box Tunnel of the Great Western Railway in 1841 revealed the extensive beds under Box and Corsham Downs. At the present time, between two and three million cubic feet are quarried annually. Bath freestone is of the Mesozoic epoch; but the theory which gave it the name of "oolite" is now superseded by a more reasonable one, in accordance with what is observed to be now going on at some of the German springs. The water issuing from the earth, and strongly impregnated with lime, gives up that substance in minute particles as it comes in contact with the atmosphere. These particles, kept in suspension by the force of the issuing water, attract more lime by affinity until the successive accretions render the particles too heavy to be maintained by the water, and they sink to the bottom to be joined by others. Observation by a powerful microscope of a section of one of these grains reveals concentric rings, bearing out this theory of their formation. An analysis of the Corsham variety of this stone by Professor Attfield, F. C. S., shows: carbonate of lime, 97.2; oxide of iron and alumina, 1.6; silica, 1; and carbonate of magnesia, 0.2; while Mr. Kirkaldy has found a six inch cube to stand a pressure of over three thousand pounds per square inch before cracking. The area over which the stone extends is several thousand acres, but the beds vary greatly within short distances, from six feet in one solid layer to twenty-six feet in several strata. The method of working has been but little improved since the stone was worked systematically, because no mechanical means have been found to give such good results as the primitive getting-by-hand labor. With slight exceptions, the stone is got by mine drifts and workings. A six-inch groove is holed with the pick in the parting at the top of a layer to a depth of five feet, permitting of the introduction of a hand-saw, with which a vertical cut is made at right angles to the face, down to the parting at the bottom of the layer. Another vertical saw-cut is then made about five feet from the other, but inclined towards it at the back. A slightly wedge-shaped block is thus detached on all sides but the back, and it is broken off here by driving wedges in at the bottom parting, and drawn out by a crane, assisted by crowbars. The hole thus made permits of the next block being sawn at the back, as well as side, when it is drawn out in the same way, and so on right and left. The great success achieved by Bath stone is due to its remarkable weathering properties, combined with its warm, pleasing tone and the ease with which it is wrought. It has been selected for a church at Brisbane, and has been sent to Sydney, Melbourne, and Cape Town. A consignment was once shipped to New York, but was neglected, owing to the want of a good agent to look after it.

During the meeting the old Roman baths were shown to the members by Major Davis, F. S. A. These extensive remains are of quite recent discovery, though the modern baths were to a large extent built over them, utilizing the same springs, which now yield more than three hundred gallons a minute of water at nearly 120 degrees Fahrenheit. The British Association has voted £100 towards the excavations, which have already revealed five large basins, showing that the Roman baths probably extended over six or seven acres.

Contiguous to the baths is the fine Abbey Church, the lineal successor of a monastery founded by Osric in 676 A. D., and begun, probably, by King Offa in 773, Æthelstan granting estates to the convent in 931. A charter refers to the church in 957 as a "*mira fabrica*," and King Eadgar was crowned there in 973. Though

touches of artistic genius are wanting in the details, there is nobility of conception in the whole structure — mingled merits and defects of the period in which it was erected. A large congregation filled the Abbey on the Sunday morning of the meeting, when Dr. Barry, Bishop of Sydney, told the members that there was no antagonism between true science and religion. J. W. P.

THE GERMAN NATIONAL INDUSTRIAL EXHIBITION IN MUNICH.

NO town on the Continent, perhaps, possesses the decorative instinct and habit in so trained and so widespread a degree as Munich. It is, indeed, little short of astonishing what a hold the styles of building and furnishing have upon the popular imagination. Wine shops are advertised as being in a certain "style"; the "style" of a tenement-house is mentioned in notices for renting or sale; small eating-houses even stick a placard in a window calling attention to their "old German," "rococo," or new-style rooms.

And if this strikes a stranger, he is no less impressed the longer he stays in the city, at the solidity of decorative furnishing in private homes. In place of the cramming of "old" things into rooms, the sticking up of cheap fans, bits of drapery, and so forth, on the walls, which is frequent elsewhere in the glimpses he gets into the parlors of average middle-class families with ambitious daughters, there is seen in Munich a measured and sterling aim in decoration, set by the *men* of the family. They are artists, children, brothers, relatives or friends of artists, or workmen in business houses that patronize artists, for Munich, so small as the city is, possesses nine hundred professional painters and sculptors, besides innumerable students and amateurs. For a century the fine arts have been magnificently patronized and unremittingly studied. Decorative taste comes, in consequence, from above downward, and is stamped with the indelible trait of a high origin.

And what characterizes the city marks the National Exhibition. For far from being what one sees every day in shops, the objects displayed are, for the most part, of especial worth. They are perfectly beautiful examples of their class, or successful attempts towards victory over a difficult technical process. There is little heaping up of miscellaneous and indifferently good or bad wares. And, although a price is attached to articles, the instances are few where business firms place agents on the spot for selling. Selling is done through the secretary of the Exhibition at the Fine Arts. If the accusation that Munich means to make herself the centre of industrial art in Germany be a fact, she opens her competition with measure and dignity, while the visitor gains through the rivalry that has stimulated the towns of the empire to send their very best.

Dresden sends the interior of a room ornamented with her specialty — porcelain; with enough besides to make her display of priceless value. A rumor runs to the effect of the interior being a portion of one of King Ludwig II's marvellous chambers. But it is only similar in style. The room of Ludwig II is of polished, sweet-scented violet, whereas the wood portion of the Exhibition display is a cheap substitute. What are duplicates are the wonderful garlands of porcelain flowers suspended about the grand mirrors, and mantlepiece, and substituted in place of painted patterns in the panels of the doors.

Rococo interiors are many, especially among the native Munich displays. A *salon* exhibited by an Augsburg firm is a timid acceptance of rococo in construction, with a retention, however, of the prevailing warm deep tones of the renaissance. A remarkable adoption of walnut wood, that has gone out of favor with Americans, is seen in a display of the famous firm of Ballin, where it is employed in a polished form for a state bed-room set, in the style of Louis XIV. Oak remains the favorite wood for dining-rooms and gentlemen's salons. Mahogany, that has a color harmonious with renaissance, but not the tone when polished to suit the prevailing shades of lustrous draperies, so that it has long been out of use, appears in an etched condition, in a boudoir set, covered with gray plush.

Ebony is hardly seen. White painted soft woods, on the other hand, once one of the ruling factors in the white-and-blue stuccoed halls of German castles, at the beginning of the century, come in again: this time with rococo fayence stoves. The apartment at the exhibition is not furnished in full: but in Eastern Germany I have seen these old-fashioned halls, and they make almost the best possible background for the warm-tinted toilettes of modern fashion.

A reaction against the renaissance style, which is plainly proclaimed at the exhibition, if towards the rococo alone, would necessarily abolish the tendency to over-furnish. It might free our society-rooms at least from vulgar competition through their crowd of objects with the number of guests. The rococo is *par excellence* the style for apartments destined for formal, social receptions: its inconsequences and delicacy being the very embodiments of the light wit and easy dash that mark high-bred occasional intercourse; while its cool, light tone of coloring and fewness of pieces heighten the effect of warm flesh tints and leave the company what it ought to be, the chief thing in the room. But while Munich takes a stand for rococo, other portions of the Empire retain the old German style, and rococo is hardly more cultivated than mixed or foreign styles: a so-called "English" style, and attempts at the Japanese.

I say attempts, because as the Japanese people have no furniture in their rooms in our sense, it is only an application of patterns of design, color, or technique that is practicable; the construction of pieces of furniture, such as chairs, tables, beds and sofas, must always be essentially European.

A carved cupboard from the well-known house of Kimbel, in Breslau, is a fine example of what worth the relief and free round ornamentation of Japanese bronzes can be as hints for a sister art. Schönthaler of Vienna exhibits Japanese paintings and glazing as the decoration of a pretty writing-cabinet set of cheap pine and fir wood.

Among the separate single objects of modern celebrity that are displayed amidst the tens of thousands of competing articles without names, are the gold chiselled table ornaments, given to the present Emperor William II, from the contributions of the cities of the Empire, on the occasion of his marriage, in 1881; the crystal-glass goblet, designed by Eisemenger for Lobmeyer & Co., of Vienna, from the Austrian Museum; and the bed-of-state of the ill-starred King Ludwig II.

The Exhibition building itself, finally, is worthy of note. It is extensive, yet was completed in fifty-six days, the style being an early rococo. The bulky white length of connected pavilions rises from the low, green bank of the Isar river, the water being reached with ease, by a broad flight of steps, at whose base, on either hand, reclines a marble water-nymph. In the midst of the river three giant geyser-like fountains are constructed which are illuminated at night by colored streaks of light from the shore, — a bold artistic effect of uncommon beauty. The electric lights used for illumination are engineered on the ground from the current of the same river.

COUNTESS VON KROCKOW.

EXCAVATIONS AT CYPRUS.

THE work of the Cyprus Exploration Fund, carried on by members of the British School at Athens during the past winter and spring, has been more than once referred to in these columns. We are now in a position to present our readers with a more detailed record, based upon the reports of Mr. Ernest Gardner, the Director, and of Mr. R. Elsey Smith, the architect of the expedition.

A preliminary tour of exploration was made in December by Mr. Gardner and Dr. F. H. H. Guillemard, who visited the ancient sites of Cerynia, Lapithus, Soli, an early Phœnician temple on the Limniti River, Polités Chrysokhon (probably Arsinoe) and new and old Paphos. On a later occasion Mr. Gardner also visited Amathus and Curium. Various circumstances delayed active operations until February, when Mr. M. R. James conducted the excavation of a hill called Leontari, near Nicosia, containing traces of early houses and walls, deep cuttings in the rock, a massive fort and archaic tombs. No deci-ive evidence was forthcoming as to the date of the massive walls of the fortress, which are attributed by some competent authorities to Roman times, but are more probably mediæval. The top of the hill, however, was occupied on the north by a network of primitive walls, mixed with early pottery and other objects pointing to a remote period, and by an early wall of fortification, replaced in later times by the massive one still extant. On the south of the hill lay tombs of an equally archaic period, which yielded about 200 vases and other objects in bronze, lead and silver. The rock of Leontari is a remarkably elevated tableland of sandstone formation rising 130 feet above the surrounding plain, and 520 feet above the sea level; it has a steep cliff at the top running all round the hill, which renders access difficult. The hill, having a circumference of nearly a mile, offers too long a line of defense for the men who could find refuge on it; advantage has, therefore, been taken of a narrow neck of land, which divides the hill into two unequal portions, to form an inner citadel of the smaller northern half. It is here that all the traces of building were found; the tombs all lie beyond the wall on the southern half of the hill. This arrangement recalls the general plan of the fortress of Tiryns, but at Leontari the inner citadel itself has a circumference of almost the same length as the whole fortress of Tiryns. Relying for the most part on the natural slopes of the hill for defense, the inhabitants only raised a wall across the isthmus at one exposed point. This wall, like all those in the northern hill, was built of small, unhewn stones, laid without mortar and carefully fitted. Nowhere, however, is there more than a single course flush

with the ground. The wall was six feet broad, and had a large tower sixty feet square at its west end, and possibly another at the east. A few feet south of this wall are extensive remains of a far more massive structure, consisting, likewise, of two great towers and a curtain-wall. The west tower, which is the most perfect, consists of a single chamber thirty-two feet by fifty-seven feet, with walls sixteen feet thick. The curtain-wall is ten feet thick. The inner lining of the towers consists of good ashlar work, while the outer facing of the walls, above a plain base, consists of very fine rusticated work, *i. e.*, blocks having a raised centre panel with a broad chisel draught all round. The core is entirely of stone, set in a hard white mortar, and laid in courses about two feet high, containing here and there stones of the full height of the course, but mostly built of smaller stones. To sum up, we seem to have in Leontari Vouno traces of a very early settlement, as evidenced by the tombs, to which we may refer the slighter early walls, while the more massive walls belong to a later occupation, probably in mediæval times.

The principal work of the season, however, has been the excavation of the great Temple of Aphrodite at old Paphos. As one of the two or three great centres of worship in the ancient world this site seemed almost certain to yield important results. It had never been excavated, although such an authority as the Central Archæological Institute at Berlin had long held its excavation to be most desirable. Digging was begun upon February 3, and carried on without intermission until May 5. The actual site of the temple having been ascertained by the cutting of deep trenches in various directions, the whole of the accumulated earth was gradually removed, so that not only was the plan left clearly visible, but the inscriptions and other antiquities scattered about could not fail to be discovered. First, as to the temple itself. It is known to have been of great antiquity and of Phœnician origin, and it was apparently but little altered by the Greeks when they became the ruling power in the island, for nowhere on the site were found traces of any building at all resembling the usual Greek temple. In Roman times it was twice damaged by earthquake — in the early part of the first century and toward the close of the second. Each time it was restored with great magnificence, but although the Romans made important alterations and additions they do not seem to have wished to change the main character of the building, or even to any great extent the arrangement of the various parts. Coins exist of Roman times giving a view of this temple, and showing a tall central chamber or cella, with lower chambers or porticos on either side and a court in front inclosed by a wall with gates. A coin of Byblos, a town on the Phœnician coast, shows a temple of very similar structure, with a large court surrounded by a wall containing the sacred cone and entered on one side through a lofty portico. We have a tolerably full description of one building — Solomon's temple at Jerusalem — which may practically be considered a Phœnician temple, though, no doubt, modified by the circumstances of its construction. In the main there is a strong correspondence between the temple at Paphos and the account of Solomon's temple given in the Second Book of Kings. In both we get a series of large outer courts; in both a lofty central chamber of small dimensions, flanked by lower ones. Every part of the site which could be examined at all has been explored down to the rock level.

The temple stands on a considerable elevation above the sea on ground which slopes gently seaward for some distance and then dips suddenly down about a mile from the coast. . . . Though the construction is Roman, there is good ground for believing that the general character of earlier buildings is here, as elsewhere, retained; of such earlier and smaller chambers sufficient traces remain to allow of fairly accurate restoration. The stoa was probably roofed, and entered from the south by a projecting portico. Running round the walls inside is a broad platform two feet above the general floor level; from the low wall which supported this platform project a series of small corbels to carry a seat. The floor at the lower level consists of a geometrical mosaic, carefully laid in marble of delicate natural tints. This was probably the portion of the temple to which worshippers would be first admitted, and would thus answer to the outer court of Solomon's temple. Under this mosaic floor were found several inscriptions, the marble head of Eros, and various fragments of bronze and terra-cotta. North of the stoa comes the central hall, also of Roman construction, and so arranged that its south side is formed by part of the north wall of the stoa, from which no doubt it was entered direct. This hall was probably covered by a roof, and had a double line of columns, as in the great stoa on the Acropolis at Athens between the two theatres. But the walls as they stand are very imperfect. Both this hall and the stoa were of the Doric order, and some architectural fragments were recovered. The hall is of much smaller dimensions than the stoa, and seems on the north side to have opened into a great court without roof. Here, probably, and in the hall stood many of the dedicatory bronze statues of which the bases were found buried in a large pit. The whole of the space east of the hall and court was occupied by a series of chambers of considerably earlier date, with walls much more regularly built of carefully-prepared stones of moderate size, generally laid without mortar. Owing to the curious angle at which the Romans set the south stoa to the earlier buildings, the southernmost chamber is of an irregular form. The central chamber is the most perfect. All the walls are of early date, though the south wall has been partly rebuilt in Roman times. Remains of a late stone floor are interesting as giving the probable floor level. Under it, besides fragments of a Cypriote and other tablets, were found a very fine bronze gilt pin and a crystal cylinder belonging to a sceptre. In default of direct evidence as to the position of doorways, the difference of floor level shows that there can have been no access to this chamber on the north side. The main entrance was probably on the east. North of the central chamber is a broad passage or chamber, with no wall to east or west. This may have formed a great entrance for special occasions, and might thus be identified with the central feature represented on the Cypriote coins as giving a view from the open court. Two large bases for piers actually exist at the east end of the passage where piers occur on the coins. The west end was probably open. The chambers north and south correspond to the lower buildings on the coin with the court-yard extending in front of them. The chambers were probably connected with the administration of the temple, or formed residences for the priests. Finally, along the north side of the open court and overlapping part of the chambers is the north stoa, of smaller dimensions than the south stoa and with no columns in it. The floor is mosaic, but much coarser than that in the south stoa. The walls are partly Roman, partly of earlier date. Outside this stoa, which apparently formed the north boundary of the temple site, occur detached fragments of walls and small courts of Roman date, belonging, no doubt, to residences or offices for the priests or attendants of the temple.

A brief account must now be given of the antiquities discovered at Kuklia and elsewhere. On the site of the temple itself the most numerous and important finds were the inscriptions, amounting to about 150. Three or four, more or less fragmentary, were in the Cypriote syllabary. Two marble tablets call for especial mention, one containing a letter from Antiochus to Ptolemy Alexander; the other the list of contributors to the Elaiochristien, doubtless a feast connected with the ceremony of anointing the sacred cone. Another tablet bears an elegiac inscription recording that at the suggestion of King Nikokles the town was fortified; Nikokles conspired with Antigonus against Ptolemy in 310, B. C. But by far the greatest number of inscriptions were on the pedestals of statues dedicated in the temple in Ptolemaic times. The titles, both of the corporate bodies that dedicated them and of the officials in whose honor they were set up, throw much light upon the constitution of Cyprus during that period. Many of these bodies seem to have been military colonies established in the island. The officials usually bear the title *suggenes tou basileos*, with commonly the addition *strategos*. The offices of Admiral or high priest are sometimes associated with that of Military Governor. Several other officials of the Ptolemaic service are mentioned, *e. g.*, *tropheus basileos*, *arkisomatophulax*, an officer described as of the great library at Alexandria, and a mysterious official called the *arkedeatros*, of whom we hear nothing more. Other antiquities were hardly so numerous as might have been expected, but were still of considerable importance. Naturally, on this site there were found several rude images of Aphrodite of primitive form, but not a large number of the Cypriote statues and statuettes which have occurred on other temple sites in Cyprus. On the other hand, there have been found some important examples of purely Greek work — a small marble head, of later archaic style, about the beginning of the fifth century; and, above all, a marble head of a boy, about life size, which may, perhaps, be known in the future as the Eros of Paphos. This is of the finest Greek work and in perfect condition. Various heads and other fragments were found; but, perhaps, second in importance, comes a very richly-worked gold hairpin, the top of which is adorned with four goats' heads and above them four doves. The whole is a beautiful specimen of goldsmith's work. The bulk of the tombs examined in the neighborhood of Paphos had been rifled in ancient times, and even what was left was later than the date of the tombs. The pottery found in the few tombs undisturbed could not be assigned to a remoter period than the seventh or eight century, B. C. With this, however, were sometimes found vases of unmistakable Mycenæ type, seeming to show that the very remote epoch commonly assigned to these vases is to some extent erroneous. In later tombs a considerable number of glass vessels was found, some of them remarkable for their shape or coloring. On the whole, however, Kuklia is not a tomb site — probably because its ancient fame and wealth have in all periods attracted riflers who have left but little for the gleaners of to-day. The chief result, then, of the first season's work of the Cyprus Exploration fund has been the plan of the great Temple of Paphos, built according to Phœnician traditions, and so adding to our most scanty knowledge of the Phœnician temple, as famous in the ancient world, and as often mentioned in literature, as any known to or built by the Greeks. Since the completion of active work Mr. Hogarth has been engaged in a careful archæological survey of the island, and his report will help to guide the committee in future operations. In the meantime a site has already been decided upon for next season's work, which is confidently expected to yield a rich harvest of antiquities. — *London Times.*

It is reported that settlement has occurred in the piers supporting the north staircase, in the Capitol at Albany, owing to false bearing on the found tion, and that they have been strengthened by putting iron-beams under them.

THE GAMBETTA MONUMENT, PARIS.

LE MONUMENT DE GAMBETTA, PLACE DU CARROUSEL, dapès du Tonnoir.

THE competition for the monument of Gambetta was opened in 1884. As the result of the first competition, M. Boileau, *fils*, architect, and M. Aube, sculptor, were admitted to the second competition, and were successful over the other competitors. It is the work of these two artists that was inaugurated on the 14th of July. M. Boileau presented in competition four designs for different sites, one on the axis of the Avenue of the Republique prolonged, near the Cemetery of Père LaChaise; the second, before the Chambea of Deputies, fronting the Place de la Concorde; the third, in the Place Medicis, fronting the Luxembourg and the Pantheon; and the fourth, on the Boulevard de Belleville. The design adopted was finally placed on the Place du Carrousel, backing upon the small garden of the Louvre and facing the Arc de Triomphe. The monument is in form a pyramidal pilaster. On each side of the base are two seated figures in bronze, Truth, holding a mirror in her hand, and Force clad in the hide of a Classic lion and with fasces in hand, replacing the traditional hammer; that is to say, force growing out of union in place of brute force. Lower, seated in the same way, are two naked infants holding medallions, upon which are inscriptions. The principal group is cut in the block of the monument, near the base of the pilasters. Gambetta is represented standing, his arm outstretched; at his feet combatants, whose courage he reenforces, and flitting somewhat above him and bearing a flag, the allegorical figure of the La Patrie. Above the group are engraved these words, pronounced in November, 1870:

"*Français, élevez vos âmes et vos resolutions à la hauteur des*
"*périls qui fondent sur la patrie. Il dépend encore de nous de*
"*montrer à l'univers ce qu'est un grand peuple qui ne veut pas périr et*
"*dont le courage s'exalte au sein même des catastrophes.*"

The lateral faces, simpler in design, are only decorated by allegorical figures on the sub-basement; at the right, Truth, at the left, Force. The faces of the pilasters are covered with inscriptions recalling the chief points of his principal orations. Force underlines the speech at Cherbourg in August, 1880, and Truth the advice to the young men of the schools in April 19, 1870. The rear façade, upon the square, is ornamented at the base of the pyramid by a marble flag with an inscription surmounted by a trophy in high relief; in the centre of this trophy are a roll of manuscript and a crown, on the right a book, and on the left a shield bearing an inscription; finally, a crowing cock, emblem of patriotic vigilance, the fasces of the Union, arms and oak branches.

This bit of work is good and deserves attention. Before the tablet, which bears the inscription, are two seated infants holding one another by the hand, one personifying Labor, and the other Military Art. Finally, above the trophy, is engraved a fragment from the speech at Grenoble, September 26, 1872. The monument is finished by an entablature supported by a decorative capital with four volutes at the angles. Upon the front, between the volutes, is a shield with the letters "R. F." the fasces and a crown of ivy. Upon the lateral and rear front, above garlands which unite the volutes, are flags bearing the inscriptions "Liberty," "Equality" and "Fraternity," with proper emblems. Finally, above and crowning the structure is a figure of Democracy borne on a winged lion, which places its two forepaws upon a stone socle.

In this monument M. Boileau has put in execution his principles concerning the presentation of decorative figures on the stone itself without plinths. "I have always understood in this way, "said he, in his monograph, "for figures of this kind I consider the employment of a plinth, puerile as it may appear at first sight, as a certain sign of weakness of decorative perception. In a monument, a statue of a hero can be presented at a particular place made for it, isolated upon a pedestal which bears it alone. It can be conceived as an entirety existing by itself, having its value complete to the exclusion of any pedestal whatever upon which it may be placed; but if the pedestal is decorated with accessory figures, why should we wish that these in their turn should be treated like heroes? With such a scheme there could be made from a mass of statuary a perfect exhibition of works of art upon an *etagère*. A perfect whole will never be made at a single stroke." This theory is ingenious and is not wanting in truth, and his application of it in the composition of the monument of Gambetta is very ably developed. The crowning piece, particularly, is superb; the movement of the winged lion is impressive in its truthfulness. The theory of M. Boileau in this morsel is fully demonstrated, but it is not proved that it must be absolute. It could even be pointed out to M. Boileau that in his competitive design for his monument at Versailles — the monument of the Constituent Assembly — he made a most unfortunate application of his theory. Upon steps of granite at the foot of the pedestal supporting the column which formed the monument, he placed, flat upon the stone, two bronze statues of Mirabeau and Bailly, who had an air of being two personages entirely independent of the monument, like two statuettes "placed upon an *etagère*," and not in any manner forming "a whole formed at a single stroke."

This criticism cannot be applied to the monument of Gambetta, which is a good composition and a good whole. Perhaps fault might be found, that the seated figures assume too much importance, and that the details of the capital of the crown are a little meagre. This lacks projection, and the volutes are very small. As to the principal group, it is of a fine movement. M. Boileau, in his monograph of the monument — a very interesting work, in which we only regret that we do not find a little more modesty — compares it to the group by Rude on the Arc de Triomphe. This is evidently an exaggeration; but, really, it is a fine bit of sculpture and full of movement. The allegorical figure of La Patrie has a little too much projection, and seems about to fall upon the principal figure. The whole monument is carefully executed, the inscriptions are well engraved, the lines in the upper part of the monument being large and diminishing in proportion as they descend, so that they may be easily read.

In short, the monument of Gambetta brings to the Place du Carrousel an important decorative feature. While new, it will be very fine. Time alone will show whether the employment of bronze in the construction, exposed to the changes of the season, is prudent, and whether the stone will not soon be covered with black and dirty stains, such as are unfortunately seen on the Grand Opera House.

Finally, this is the total cost of the work: Masonry, carpentry and metalwork cost 141,500 francs; statuary, 951,905 francs; ornamental sculpture, 28,500 francs; marble and inscriptions, 6,500 francs; commissions, 18,000 francs; models and casts, 3,595 francs; total, 350,000 francs.

COMMUNICATIONS

THE PRESENT PRACTICE OF SLOW-BURNING CONSTRUCTION.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs. — In reply to the queries and suggestions of Mr. Atkinson in your October 13 issue, it seems to me that, perhaps, more is being done in the interests of good construction and protection from fire, than would seem to be the case, in view of the great mass of reckless and unscientific building always in progress about us.

The higher cost of good construction over that which is flimsy and dangerous — like that of most other good things — is, admittedly, a most serious drawback in the progress of the movement for better buildings, and where insurance can be so easily and cheaply obtained, owners are discouraged in investing money for their own security against fire, when they can throw the risk upon the insurance companies and save considerably in first cost. Still, there are owners who are willing to listen to advice for better construction, and follow it.

In my own practice I have been able to carry out several pieces of construction, recently, of an improved type, and the owners' appreciation, seem to show that in some instances, at least, a wish for better building is developing. The Chadwick Lead Works, on High Street (Fort Hill Square) in Boston, is a six-story building, covering about six thousand feet of land, and having three street frontages. The construction is almost entirely such as would satisfy the insurance inspectors of the mills.

All floors are of "mill-construction." The roof is four inches thick and without concealed spaces; none of the walls are furred; there are no wooden cornices nor cornice furring. Although the

floors were to be loaded with lead, in its various forms, each floor-beam, girder and column was calculated for its load. After a section of floor was put on, it was experimentally weighted with a known excessive load of bricks which remained in position a week, the deflection noted, and on removal, no permanent set discovered. Such a floor is entirely practical for heavy warehouse purposes.

A building for the Otis heirs, on Otis wharf, Boston, has a similar construction, and is heavily loaded.

The Boston Terra-Cotta Company's building, on Federal Street, I built in the same way, and what would have been a disastrous fire in a building of ordinary construction (a fire among a lot of dry wood patterns on the third floor) was extinguished after it had got well underway, with a minimum damage to the building.

The Massachusetts Charitable Mechanics' Association building, on Huntington Avenue, is of mill-construction, so far as the managers would consent to its use. The system was less well-known then, and divided counsels permitted my carrying out but a portion of the building in "slow burning" construction.

The Lincoln Library, a gift to the town by Geo. Grosvenor Tarbell, has ceilings wire-lathed, close to underside of heavy planking, with timbers in sight. Vaulted outer walls plastered directly on the brick. Roof of plank on widely-spaced heavy rafters, and as far as possible not a concealed space in the building. A stand-pipe and hose are provided for basement and first floor, and although, of course, not fireproof, its destruction by fire would be almost an impossibility.

The building for the School for the Feeble-Minded, at Waltham, is constructing with stone walls, furred with porous terra-cotta. Partitions, brick or 4″ porous terra-cotta; floors, mill-construction, 3″ plank; roof, 3½″ of wood; kitchen and laundry floors asphalted on corrugated iron.

The succeeding buildings are to be of similar construction.

In several dwelling-houses I have found a mill-floor for the ceiling of the cellar an excellent precaution both against fire and vermin.

By using a roof of four inches of wood, in the Savannah Cotton Exchange, the directors were enabled not only to decrease their fire risk, but to obtain a very handsome rental for a series of offices in the attic story, over the Exchange Hall. Offices in this position, under the roof, were considered as absolutely impracticable by residents of Savannah, on account of the excessive heat which had always penetrated a 1″ board roof, a ventilated air-space and a plastered ceiling below. I was permitted to build the offices, however, and put four inches of wood between the tin roof and the occupants' heads beneath.

The result has been a success. The first of July, 1888, I found only a difference of one degree in temperature between the street floor and the upper one — and that one degree in favor of the upper rooms!

A private house in Savannah with 3″ of wood for its roof, is much appreciated by the occupants of the pleasantest rooms in the house — those in the upper story.

The foregoing are some of the instances which occur to me, of the use of mill-framing and slow-burning construction in my practice, and other architects have, doubtless, been equally active.

"Fireproof" construction at the present prices of iron and terra-cotta is practically prohibitive in most cases, and we must develop as far as may be "slow-burning" methods. The insurance companies can immensely aid us in the good work by a generous discrimination of rates in favor of improved methods of construction.

Wm. Gibbons Preston.

EYE-BROW DORMERS.

Ceredo, W. Va., October 19, 1888.

To the Editors of the American Architect:—

Dear Sirs, — I desire to obtain some information in regard to manner of slating, as practised by slaters in and about Boston, for "*eye-brow*" *dormers* similar to those shown by Gelatine print of "Crane Library," Quincy, Mass., issued with No. 392, *American Architect*, June 30, 1883. I believe this style of dormer was first introduced in your vicinity, and presume by this time your slaters have demonstrated the best and neatest way of covering them with slate. I have enquired of slaters in this vicinity, and some from Cincinnati and Columbus, at work upon buildings under my supervision, and they all admit they have never covered any, but suggest various ways in which they think it might be done, but I have little faith in securing an effective job by the methods proposed by them. Believing that I can get the necessary information from your office, I make the application with request that you reply by mail as soon as convenient, informing me of any charge attending same and I will remit.

Very respectfully, S. Floyd Hoard.

[Most of the "eye-brow" dormers in this neighborhood are covered either with shingles or tiles, either of which are more tractable than slate. Whatever is used, to cover them as they ought to be done, the curves are made as gentle as possible, and the tiles, slates or shingles carried over without any break in the courses, just as if the roof had been slated in the ordinary way, and then bulged slightly upward. Roofers are generally disposed to make the curves much too sharp, so that slate will not lay well, and metal is needed in the valleys, which spoils the appearance of the whole affair. — Eds. American Architect.]

NOTES AND CLIPPINGS.

The Tomb of Alexander the Great. — According to a Berlin correspondent news, has been received from Egypt to the effect that the tomb of Alexander the Great, which Dr. Schliemann sought in vain last winter, has now been discovered in Alexandria. The coffin is of marble, and is covered with beautiful decorations. Its breadth is about three feet and a half and its height three feet. The skull of a man was found in it. The coffin was found in a brick vault, about twenty feet high, covered by about eight feet of earth. The keeper of the museum at Boulak is going shortly to make a thorough examination of the tomb. — *Pall Mall Gazette.*

London Rookeries and their Enlightened Owner. — There seems to be a prospect of the scandal caused by "Lord Salisbury's rookeries" coming to an end at last, and a very appropriate end, too. The dilapidated, rickety, unsanitary tenements in Cecil Court have at last reached such a stage of decay that they can hold together no longer. The roof of one of them collapsed last week. At a meeting of St. Martin's Vestry, the surveyor stated that he had obtained the necessary certificate that it was dangerous to pass through the court, and accordingly the traffic had been stopped, and policemen had been placed on duty to keep people out of danger. When a few more formalities have been gone through, what is left of the wretched structures will be demolished by the Board of Works. A pretty state of things, this, truly, on the estate of the prime minister of England, and a leading authority on the housing of the poor! — *London Truth.*

TRADE SURVEYS.

A very large amount of work of an engineering character is being placed in the machine shops, foundry and machine-making establishments of the country. This branch of industry is assuming a magnitude that is surprising even to those whose business it is to keep run of extensions and improvements. The expenditures for machinery-making facilities are quietly made in all parts of the United States and their aggregate is not even suspected, till something like a rough calculation is made. The cost of freight from far points in the far East to the far South and West, is such an item that new manufacturing establishments have been forced into existence to furnish the newer sections of the country where fuel, raw material, cheaper labor, lower freight rates and nearness to consumers all act as incentives to the establishment of new works. The organization of iron works, mills, furnaces, the establishment of pipe works, terra-cotta works and general machinery establishments, bridge works, electrical supplies, hardware factories, carriage works, nail factories and a hundred and one industries in localities where heretofore dependence for supplies was placed upon the older cities is one of the encouraging features of the past year. This decentralization of industries is a necessity for many reasons. The departure of these manufacturing establishments, starting up in these new sections of the country is one which will grow in magnitude year after year. It is to be noted that the development of coal mines in the West and South is responsible for a large amount of this enterprise and within the past two years upwards of 100 mining companies have established themselves successfully in localities where a few years ago the existence of coal was hardly supposed. Excellent deposits of fine manufacturing and steam-raising coals are found to be at moderate depths below the surface. It is found by use to be adapted to domestic, manufacturing, railroad and all general purposes. Eastern promoters of industrial enterprises throughout these new sections have all been giving a very good account of their industries and attach much of their success to cheap fuel and some of it to more equitable freight rates that are now prevalent. In addition to this, discovery is made, that labor in these far Western towns is more contented than in the East. One explanation of this contentment is shown to be that the wage-workers have more houseroom, more pure air, greater liberty and are less subjected to vexing agitations which find rise from overcrowded surroundings. They are satisfied to work along quietly with such rates of pay as their employers find it possible to establish. Besides this there is a great deal of quiet railroad building going on in the West developing localities that in the far East were never heard of. The effect of all this is to create a demand for every kind of machinery turned out. Accordingly, shop labor is in good demand.

All of our locomotive works are booking orders from week to week for more and larger engines. The variety of engine work demanded was never so great. Machinery is wanted for well-boring purposes throughout the arid regions of the West. Engines are in demand, and there is a demand also for street-paving material, to say nothing of the endless demand for electrical supplies and equipments. A vast amount of sewerage work was undertaken this year, and will be completed next. The Western and Southern people are looking particularly after their sanitary interests. Large water-supplies are being established all through the West; large irrigating companies are being established, and the demand from these sources is being reflected in the increased activity for larger machinery and in our larger machinery establishments all the way from St. Louis to Boston. In a few years what we have heretofore regarded as a purely agricultural region, and stock-raising region of comparatively little value at that, will become a thickly populated region and fertile portion of the United States that will attract capital with more force than it is even now doing. Capitalists throughout our Eastern States are offered excellent opportunities for heavy and permanent investments in the region of country between Montana and Northern Mexico. The capitalists have found in the first place that there is an abundance of coal there, and some recent developments have shown that the mineral resources of that region have been very little understood, much as we imagined we knew. Within the past thirty days the makers of mining machinery in Chicago, Philadelphia and at other smaller towns East have booked the heaviest orders that they have ever had for machinery to be delivered during the first half of next year. It is in these newer sections of country that balancing effects to maintain industrial ctivity are to be found. Reactionary influences which might otherwise develop themselves throughout the East will be nullified by the extending demands and opportunities of markets which railroad-construction and individual enterprise is opening up away to the West of us. The trade conditions of the country have not changed materially during the past month. A very heavy distribution is in progress. Jobbers throughout all our Eastern States have a good account of business prospects. In leather goods there is an advancing tendency. In lumber, prices are firm. In dry goods, and textile goods of all kinds, the distribution is keeping stocks restricted, and manufacturers are sailing close up to market demands.

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The American Architect and Building News

ADVERTISERS' TRADE SUPPLEMENT.

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THE HAYES FIREPROOF METALLIC LATHING, ETC.

The Hayes system of Lathing is composed of Sheets of Iron or other metal, 40 inches by 96 inches (or less), over the surface of which at near intervals are openings five-sixteenths by three-fourths of an inch, produced by a process of puncturing; the flanges around the openings are pressed forward and curled outward, forming lips and hooks which clinch or hold the mortar to the surface of the sheets, while at the base of each opening is formed a matrix into which the mortar is pressed, and by which perfect dovetailed clinches or bonds are obtained; the process imparts to the sheets an undulated surface, giving it additional strength. The plaster is spread over the surface of the sheets, embedding the lips and hooks and filling the matrix, thereby permitting a degree of coalescence which insures most perfect and substantial work. There is an entire freedom from expansion, contraction, or other organic action, which would be liable to injure the bond. The coating can only be removed by picking it off in particles.

Less mortar may be used than upon any other fireproof lathing and it may be applied stiffer than ordinary.

Scratch coating is entirely dispensed with, as is also hair.

For one coat work this lathing affords a most effectual foundation.

These lathing sheets can be readily bent so as to adapt themselves to any feature in architecture, such as pilasters, columns, niches, groins, cornices, wainscotings, bases, casings, angles, trimmings, etc. Large coves are formed without brackets, supports or furring, and entail no cost beyond the plain surface.

Country residences may be lathed on the exterior and the beautiful effects of cut stone designs may be made in Portland Cement, such is the tenacity of this lathing that all fears as to the falling away of the plastering will, upon inspection be instantly removed.

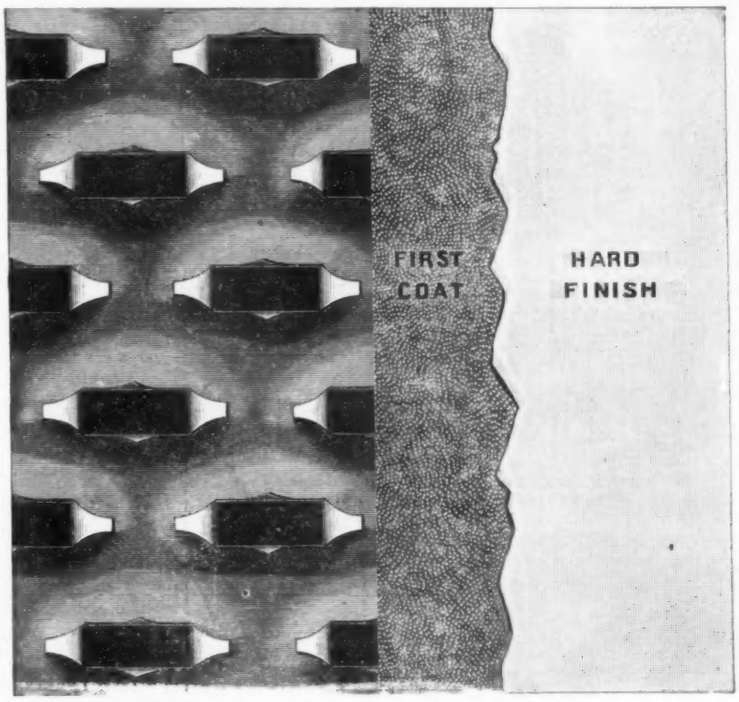


Fig. 1. Elevation of Lathing, having a portion of its face covered with "one coat" and a portion with "hard finish," as second coat, with Figures 2 and 3, sections of same.

Fig. 2.

Fig. 3.

FIREPROOF PARTITIONS.

This system of lathing permits of the construction of strong partitions of from 1½ inches thick, finished with double-plastered faces, made by forming in the lathing sheets, which by virtue of the peculiar punctures are already rigid, a series of ribs such as are made for furring, and which are secured to each other back to back as shown in Figures 6 and 7 and when necessary for an increase in strength they may be re-inforced with a framework of band or bar iron or with angle or T iron, as shown in Figures 8 to 11, the lathing being secured to the frame with suitable clamps, the plastering on both sides aiding in binding the whole together so that very substantial walls are afforded.

These partitions or walls may be adopted with great advantage especially in elevator shafts, stairways, hallways, offices, bed-rooms, closets, on about the stages of theatres, boxes, etc., affording the greatest protection against fire and great economy in room. Fireproof flues for hot air may be formed in like manner, avoiding the necessity of restricting them to the brick walls.

A fireproof floor may be made by nailing the lathing sheets over the boarded surface, and then with a proper mixture of gravel, sand and cement, or other suitable material, a permanent and effective fireproof floor will be produced, which may be arranged in variegated colors or ornamental design, or may be laid in tiles or tessellated pavements, or it may also be readily applied to old plastering in like manner as suggested to the floors, occupying but three-eighths of an inch in thickness.

For bath-rooms, wash-rooms, laundries, etc., by covering the floors as before described, and by turning up the lathing on the walls, a perfect cemented troughed floor may be made.

It will be economy, even should this lathing cause an increase in the first cost of any building, to adopt it in lieu of the old time wooden lathing; the increase, if any, would be but trifling, as less time is consumed in applying it. One coat of mortar is dispensed with; furring for cornices and other

projections are made in the lathing sheets, and entails no cost further than the plain surface; it takes up less floor space and is substantially fire and vermin proof. Any saving would be false economy in consideration of the great advantages gained.

Portable slabs or plates, composed of the lathing sheets of suitable sizes, plastered (plain or molded) as panels, stiles, wainscotings, trimmings, etc., tubes for columns, pilasters, etc., may be prepared in the workshop and set up in their final position. These may be re-inforced with bar, angle or T iron similarly arranged to those described for partitions.[1]

Very fine work has been done on this lathing with King's Windsor Cement, and Adamant Plaster, and it is specially adapted for all kinds of plastic material, the clinching hooks taking the place of fibrous bonds with a most beneficial result.

The sections above referred to and especially the method of framing for doorway shown in Figure 12, may be varied, and other methods of construction found to be more appropriate.

This lathing is furnished in iron plain, dipped in a lime coating made fast, dipped in asphaltum or galvanized, but as lime is a well-known preservative of iron, the alkali therein completely neutralizing and preventing corrosion, the plain iron or the lime coating is all that is necessary.

The merchantable sizes of the sheets will be 30 x 96 inches.

[1] The thickness of the plastering coat shown in the drawings and in models which have been prepared is no criterion as it may be made thinner if required.

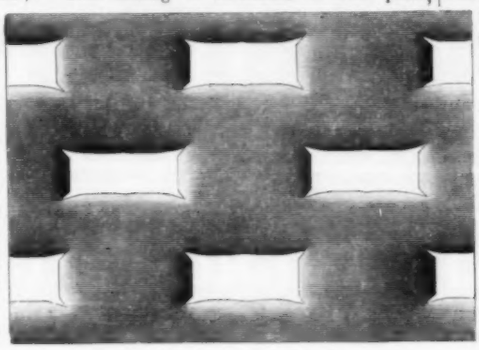


Fig. 4. Back Elevation of Lathing.

Fig. 5. Perspective showing external angle of brick wall with lathing, furring, screeding, stopped off angle bead, and cement base.

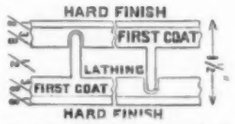


Fig. 6. Section of double-faced, two-coat plastered partition, 1½ inches thick.

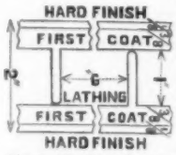
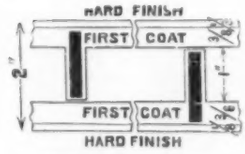
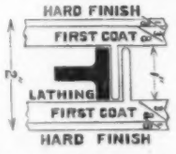


Fig. 7. Section of same, 2 inches thick.





Figures 8, 9, 10 and 11. Sections of double-faced, two-coat plastered partitions, 2 inches thick, reinforced with bar, angle and T iron frame work.

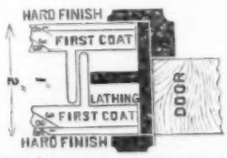


Fig. 12. Section showing a method of framing a doorway to a 2-inch double-faced, two-coat plastered partition.

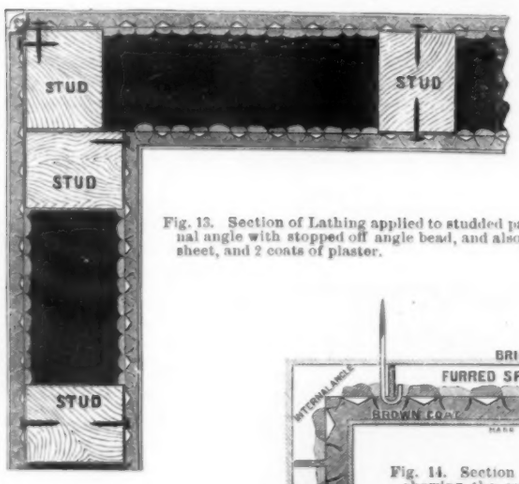


Fig. 13. Section of Lathing applied to studded partition, showing external angle with stopped off angle bead, and also internal angle bent in sheet, and 2 coats of plaster.

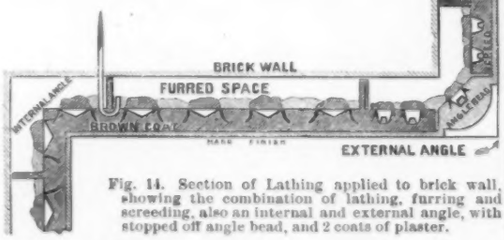


Fig. 14. Section of Lathing applied to brick wall, showing the combination of lathing, furring and screeding, also an internal and external angle, with stopped off angle bead, and 2 coats of plaster.

Any person of ordinary mechanical skill can readily apply the lathing, the angles can readily be formed in the sheets by any machine which is used in forming angles in ordinary sheets of iron.

When the lathing is nailed upon woodwork it is secured with steel barbed wire nails one inch long, or the ordinary slating nail will do, taking care to nail in a vertical line down the centre of the beam in such manner as will allow them to shrink without confliction; where the sheets overlap each other the same rule should apply. For interior angles the sheets are bent so as to avoid any cracking of the plaster at that point.

When the lathing is applied to a brick wall, ribs are formed which perform the function of furring, through the grooves of which ordinary cut-nails may be used, driven into the joints of the brickwork. Cross furring or supports to ceilings, when the beams are of iron, is composed of bar or angle iron firmly clamped, and to which the lathing sheets are secured by stout wire holdfasts of special form.

This lathing has been subjected to the criticisms of many experienced architects and plasterers in New York and it has successfully withstood severe tests as to its fireproof and sustaining properties. It is already receiving a hearty welcome from the trade.

It has been patented in Great Britain, Canada, France, Belgium, Austria, Germany, and Italy and will shortly be introduced in those countries. At present it is being manufactured by the inventor, the undersigned, who also intends to grant shop rights in every town and city in the United States, furnishing his machinery for its production.

GEORGE HAYES,
718th Ave., New York.

The Whittier Machine Company have just completed for the Acushnet Mill Corporation of New Bedford, Mass., a large upright steam boiler. This is the fourth boiler of this style constructed for them.

SANITAS PLUMBING APPLIANCES.

William Paul Gerhard, C. E., the well-known expert and popular writer and authority on sanitary engineering, writes of the Sanitas bath-tub in his article on "Domestic Sanitary Appliances," in *Good Housekeeping* for 1884-85: "Here the stand-pipe is placed in a recess, but so as to be perfectly accessible for cleaning. The outlet of the Sanitas tub is made unusually large, to effect a quick discharge, thus securing a thorough scouring to the trap and waste-pipe, the tub acting as a flush-tank. It is by far the best sanitary tub of which I have knowledge, and answers all requirements of a perfect plumbing fixture."

Speaking of water-closets, he writes: "Another form of improved hopper-closet calls for a detailed description, as it is of a superior construction, its design based upon sound sanitary principles. This is the Sanitas self-sealing water-closet, manufactured by the Sanitas Manufacturing Company of Boston.

"The closet is manufactured in white earthenware, and resembles somewhat in shape the short hopper, having only a bowl and a trap combined in one piece, and no superfluous interior surfaces, angles, or corners to which soil may adhere. The area of the bottom of the bowl has been so shaped as to present a large surface of standing water

to receive and deodorize waste matters, and the overflow point is raised much higher than usual, in order to retain a deep body of water, and hence a deep water-seal in the bowl. It should be noted that the water is deepest at the rear of the closet, at the point where soil would be most liable to strike the sides.

"The top of the bowl is provided with a flushing rim, into which the flushing water enters in a novel manner. To avoid the usual noisy operation of the flush, and also the frequent spattering, the flushing water is conducted into a large body of water below the normal water level, as shown, from where it overflows into the flushing rim, and thence down the sides of the bowl. A part of the flushing water is directed, independently of the stream which feeds the flushing rim, to the bottom of the bowl, where it enters through a jet or nozzle arrangement, discharging with great force into the ascending leg of the closet trap. This removes part of the water from the trap, and causes that which is in the bowl to sink into its neck, where it is more easily acted upon by the upper flush. Meanwhile the upper jet fills the passage leading to the flushing rim, and, overflowing, descends upon and drives out the waste matters which have descended into the neck. The lower jet is always covered by water from the upper flush, the construction and proportions being such as to ensure this result. Hence both jets are noiseless.

"In ordinary trap-jet closets no provision is made to ensure the covering of the jets, and a load roar is occasioned. These closets, moreover, are emptied by siphonic action produced intentionally in the trap, and this emptying by siphonage adds to the jet roar a disagreeable 'gulping' sound, caused by the sudden inrush of air into the dip as the water escapes. Both of these causes of noise are avoided by the flushing principle of the Sanitas closet.

"The action of the Sanitas closet is almost instantaneous, it being possible to flush it easily in one second, and with less than a gallon and a half of water.

"Another peculiar feature of the flushing of this closet is the Sanitas water-closet supply-pipe, in which all delay and noise occasioned by the water passing from the cistern down the service-pipe, when the pull is operated and the cistern valve is lifted, is avoided by constructing the supply-pipe on the principle of an inverted bottle, so that the water shall be hung in it below the cistern valve as far down as the standing water in the bowl, simply by the pressure of the atmosphere. This supply-pipe is, therefore, always full of water, the pipe being closed at the top by a cistern valve, and at the bottom sealed by the water in the closet-bowl. The flush is thus made to act instantaneously. The closet is self-sealing, for the moment the water in the trap is lowered to a certain point just above the dip of the trap, water follows from the upright supply-pipe until the trap is refilled up to the overflow line. There is thus provision made for re-establishing a perfect deep water-seal if the latter should be lost by evaporation, or even by siphonage. The latter case will but rarely occur, as the trap has more than the ordinary depth of seal. Evaporation, on the contrary, is constantly going on in houses closed during the summer months, and it is here where the advantage of the self-sealing closet and the Sanitas water-closet supply become most apparent. Finally, as every part of the closet-bowl and trap is readily accessible, and at all times open to inspection, it is easy to remove, by a sponge or otherwise, all water from the closet in houses to be left unoccupied during the winter, in which plumbing work is most exposed to freezing."

Of the pantry-sink he says: "A very convenient arrangement is what is known as the Sanitas pantry-sink, in which the stand-pipe is provided with a simple lever movement to lift it from its seat, if it is desired to empty the sink. The volume of water discharged from such a sink through a very large outlet, and concentrated beyond this in a trap and waste-pipe of small calibre, causes a thorough flushing of both, and prevents the grease from adhering to the sides of the pipe."

Speaking of basins, he says in the same publication: "Much the best form of basins of which I have knowledge is the stand-pipe outlet basin, or Sanitas wash-basin, manufactured in Boston by the Sanitas Manufacturing Company; and since this fixture will, in my judgment, soon supersede all former devices, and since it has so many superior features of simplicity, convenience, and sanitary construction, I shall describe it fully." Then follows a detailed description of the fixture, saying among other things: "It is of the utmost simplicity and of great convenience in use, while its appearance is, if anything, even more pleasing than that of the usual form of bowl."

SANITAS MANUFACTURING CO.,
207 TREMONT STREET, BOSTON, MASS.

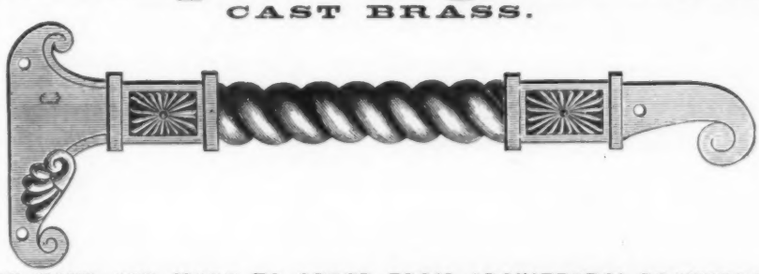
THE Whittier Machine Company have recently put in for Messrs. P. & F. Corbin, New Britain, Conn., a freight elevator.

NOTES.

THE sales of Babcock & Wilcox boilers for September, 1888, are as follows: Somerset Fibre Co., Fairfield, Me., 120 horse-power; Latrobe Steel Co., Latrobe, Pa., 832 horse-power; Edinburgh Roperie & Sail Cloth Co., Ltd., Leith, Scotland, 156 horse-power; La Espana Industrial, Barcelona, Spain, 168 horse-power; La Espana Industrial, Barcelona, Spain, second order, 480 horse-power; Oliver & Roberts Wire Co., Ltd., Pittsburgh, Pa., fourth order, 416 horse-power; Electric Light & Power Co., Melbourne, Australia, 1500 horse-power; Kansas City Electric Light & Power Co., Kansas City, Mo., second order, 1339 horse-power; Louis Franke & Co., for F. S. Dale, Whitehall, N. Y., second order, 75 horse-power; Providence Steam & Gas Pipe Co., Providence, R. I., 71 horse-power; Farmer & Brandon, London, England, 20 horse-power; Moet & Chandom, Epernay, France, 240 horse-power; F. de la Royere-Masureil, Brussels, Belgium, 46 horse-power; Alexander B. Bary, Moscow, Russia, 40 horse-power; Alexander B. Bary, Moscow, Russia, 120 horse-power; Alexander B. Bary, Moscow, Russia, 30 horse-power; Alexander B. Bary, Moscow, Russia, 20 horse-power; Societa Amoniana Raffineria de Zuccheri, Ancona, Italy, second order, 372 horse-power; Excelsior Electric Co., for S. Wechsler & Co., Brooklyn, 50 horse-power; Jackson & Sharp Co., Wilmington, Delaware, fourth order, 208 horse-power; Jackson & Sharp Co., Wilmington, Delaware, fifth order, 51 horse-power; Gubruder Sulzer, Winterhur, Germany, 140 horse-power; Louis Fontaine, La Madeleine lez Lille, France, 175 horse-power; C. B. Cortrell & Sons, Westerly, R. I., second order, 104 horse-power; Cortland Wagon Co., Cort-

Antique Hinge Plates

CAST BRASS.



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FOR PLANING-MILLS, SASH, DOOR and BLIND FACTORIES, CABINET and CARRIAGE MAKERS.

Send for Catalogue.

land, N. Y., second order, 104 horse-power; Spreckels Sugar Refining Co., Philadelphia, Pa., 7500 horse-power; Impresa Concesionaria de Aguas Subterraneous del Liobregat, second order, 61 horse-power; Alexander Smith & Sons Carpet Co., Yonkers, N. Y., sixth order, 184 horse-power; Sociodad Mahiteuse de Electricidad, Madrid, Spain, 186 horse-power; New York Life Insurance Co., Omaha Building, third order, 488 horse-power; New York Life Insurance Co., Kansas City Building, fourth order, 488 horse-power; Solvay Process Co., Syracuse, N. Y., eighth order, 416 horse-power. Making the total sales for September, 16,200 horse-power.

Soft Steel Plate is taking the place of iron for bridge, ship, tank and structural work generally. We have decided to make prices for Sheared and Universal Rolled Plate, of the grades above mentioned, as low as are quoted for iron plates for similar purposes. If in the market, write or telegraph for prices. No delays in filling orders.

At the Homestead Works we have recently completed a Slabbing Mill. This universal, reversing mill is designed, especially for rolling large steel ignots into slabs.

We are prepared to supply steel slabs, of all grades, either of Bessemer or Open-Hearth quality, of widths ranging from 18″ to 48″, of thicknesses varying from 4″ to 24″, and of any specified length.

If you are requiring steel slabs we shall be glad to quote prices.

Orders can be filled promptly.

Capacity, four hundred tons daily.

CARNEGIE, PHIPPS & CO., LIMITED,
PITTSBURGH, PA.

The Gorton & Lidgerwood Company, 96 Liberty Street, New York City, have lately received an order for four large boilers to be used in heating a large building 60 by 200 feet, and three stories in height, in the Brooklyn Navy Yard. When these boilers are set, there will be six of the Gorton boilers in use in the Navy Yard, one of which has been in use three winters, giving entire satisfaction during that time, as the following taken from a letter dated May 2d, 1888, to the Gorton & Lidgewood Co., from Chief Civil Engineer, P. C. Asserson, will show.

"In reply to your inquiry, I would state that the No. 5 Steam Generator furnished and put up by Mr. Gorton in this Navy Yard, in 1885, has given good satisfaction, and has been in continual use the past three winters for heating an isolated building of 75,000 cubic feet of space. It is economical in the use of fuel — less than one-half the amount of coal being needed than was previously used to supply the horizontal tubular boiler used for this purpose. It requires very little attention, as the automatic arrangements both for fuel and water feed work well. We have recently put up a No. 4 Gorton Boiler in a large building in this yard, as we prefer this Boiler to any other method of heating by steam."

The four new boilers will be fitted up with a new base having a standing lever shaking attachment to the grate.

Mr. I. P. Frink, of 551 Pearl Street, New York, whose reflectors and reflecting chandeliers are so generally introduced in public buildings, reports many orders on hand; among prominent contracts for lighting, he has underway: the Tompkins Avenue Congregational Church, Brooklyn, N. Y.; Summer Avenue Congregational Church, Brooklyn, N. Y.; First Presbyterian Church, Galveston, Texas; Asbury Memorial Methodist Episcopal Church, Providence, R. I.; Cumberland Presbyterian Church, Murfresboro, Tenn.; Reformed Church, Athens, N. Y.; Opera House, Carbondale, Pa.; Los Angeles Theatre, Los Angeles, Cal.; the Art Galleries of Messrs. Boussod, Valadon & Co., 303 Fifth Avenue, New York; Galerie des Beaux Arts, 174 Fifth Avenue, New York; G. W. Lininger, Omaha, Neb.; the American Art Galleries, New York, for the Verestchagin Exhibition; and several orders from foreign countries.

The Whittier Machine Company have recently constructed for the Whittier Cotton Mills of Lowell, Mass., two horizontal steel boilers, each five feet in diameter.

THE CENTURY.

SOME FEATURES IN 1889 — THE NOVEMBER NUMBER BEGINS A VOLUME — A NEW ART ENTERPRISE — KENNAN'S SUCCESSFUL SERIES.

"The growth of The Century Magazine, although in one sense phenomenal, is but the natural result of a quick appreciation of what the reading public demands, and of a studied effort to gather together the very best that writers, artists and engravers can supply." It has always been the desire of the conductors of The Century that it should be

The One Indispensable Periodical

of its class; that whatever other publication might be desirable in the family circle, The Century could not be neglected by those who wish to keep abreast of the times in all matters pertaining to culture. Its unprecendented circulation would seem to be the response of the public to this desire and intention of the conductors of the magazine; and this popularity again lays upon the magazine the burden of ever-increasing excellence. The 37th volume, nineteenth year, begins with the November number, now ready, and the following is a list of some of the more important features of the year, most of which begin in this number:

The Century Gallery of Italian Masters,

Engraved by Timothy Cole, who is recognized as the leading magazine engraver of the world, and who has already spent four years in the European galleries, reproducing upon wood for The Century this series of the most valuable pictures in the Old World. This is the most important artistic work upon which the magazine has ever entered, and in order that the fullest educational results may be derived from the pictures, they will be published in historical order, with brief critical papers by W. J. Stillman and Mr. Cole. The first of these, with engravings and notes on the Byzantines and Cimabue, is in November.

Strange True Stories of Louisiana,

Collected by George W. Cable, author of "Old Creole Days," "The Grandissimes," etc., the first one of which, and a chapter entitled "How I Got Them" appears in November. Some of these stories are merely transcribed or translated by Mr. Cable from the original manuscripts; others are accurate narratives by him of actual occurrences.

The Siberian Exile System.

The remarkable series of papers which Mr. George Kennan is now furnishing to The Century upon this important subject is attracting the attention of the civilized world, and the papers are being reprinted in hundreds of foreign journals in Europe and Asia, but are not allowed to enter Russia in any language. The San Francisco *Chronicle* says that, in these papers, "Mr. Kennan has lifted the veil and revealed a condition of affairs of which the outside world had no conception or realization." The November Century contains a strong paper in this series on "Political Exiles and Common Convicts at Tomsk," with interesting illustrations.

Lincoln in the War.

The authorized "Life of Lincoln," by his private secretaries, Messrs. Nicolay and Hay, now appearing in The Century, is holding the attention of thousands of readers. In the forthcoming chapters the authors will develop more fully the relations of the President with McClellan, Grant and other leading generals of the war, with the members of the cabinet and other prominent men. Lincoln's plan for the gradual abolishment of slavery will be fully explained.

The Romance of Dollard.

A serial novelette by a writer new to readers of The Century, Mrs. Mary Hartwell Catherwood, begins in the November number, with a preface by Francis Parkman, the historian. It is a story of devotion and heroism, based upon events in the early history of Canada. The author, as Mr. Parkman says, "is a pioneer in what may be called a new departure in American fiction." Illustrated by Henry Sandham.

Bible Scenes Illustrated.

Occasional illustrated papers by Mr. Edward L. Wilson, on Bible subjects treated in the International Sunday-School Lessons, will appear from time to time during the year, and there will be articles on existing monuments connected with the Old and New Testament narrative, by various writers. A paper by the Rev. Charles S. Robinson, D. D., on "Where was 'the Place called Calvary'?" with striking illustrations, appears in this November number, and there is also a timely essay on "The New Reformation," by the Rev. Lyman Abbott, D. D.

Pictures of the Far West.

A series of full-page engravings from original drawings by Mary Hallock Foote may be expected in each number of The Century for the coming year. These designs are the artistic result of a long residence in the far West, and are characteristic of the landscape and costumes of a large part of the country. The first picture, "Looking for Camp," is in November.

The November Century

Contains, besides the serial features already mentioned, an article on "The Guilds of the City of London," illustrated by Joseph Pennell; Unpublished Letters of Lord Nelson, with two portraits of the hero of Trafalgar; a short story, "Mistaken Premises"; "Gravelotte Witnessed and Revisited," by Murat Halstead, illustrated; Editorials, Open Letters, Poems (by James Whitcomb Riley), H. S. Edwards, Joaquin Miller and others), etc., etc.

Other serial features to be begun later include Charles DeKay's illustrated papers on Ireland,— the ethnology, customs, landscape, etc.; a series of humorous and pathetic Irish-American stories by George H. Jessop; articles by the distinguished artist, John La Farge, on Japan, with engravings from original studies; supplemental War Papers, untechnical and of general interest, among them "The West Point of the Confederacy," "Recollections of Stonewall Jackson," "Lyrics of the War," "Beecher at Liverpool," and "The Western Soldier"; more of Dr. Buckley's papers on Spiritualism and Clairvoyancy; further illustrated papers on English Cathedrals (with a chapter on Westminster Abbey); short stories by leading writers, novelettes (to be announced later), essays, etc., etc.

Terms. A Special Offer.

The regular price of The Century is $4.00 a year. In order that new readers who begin with November, 1888, may get all of Mr. Kennan's Siberian papers, we make a special offer of *a year's subscription from November, 1888, and the twelve back numbers from November, 1887 (in which the Siberian papers were begun), for* $6.00; *or a year's subscription from November, 1888, with these twelve back numbers bound in two handsome volumes, for* $7.50. Dealers everywhere take subscriptions and supply numbers, or they will be sent, prepaid, from the office of the publishers, The Century Co., 33 East 17th Street, New York.

The Century *is indeed a great living picture of the world's interests and movements, and is a library in itself, and a liberal education to every reader.*—Boston Traveller.

He who subscribes for The Century *does himself, his friends or his family an inestimable service.*—The Methodist, Baltimore.